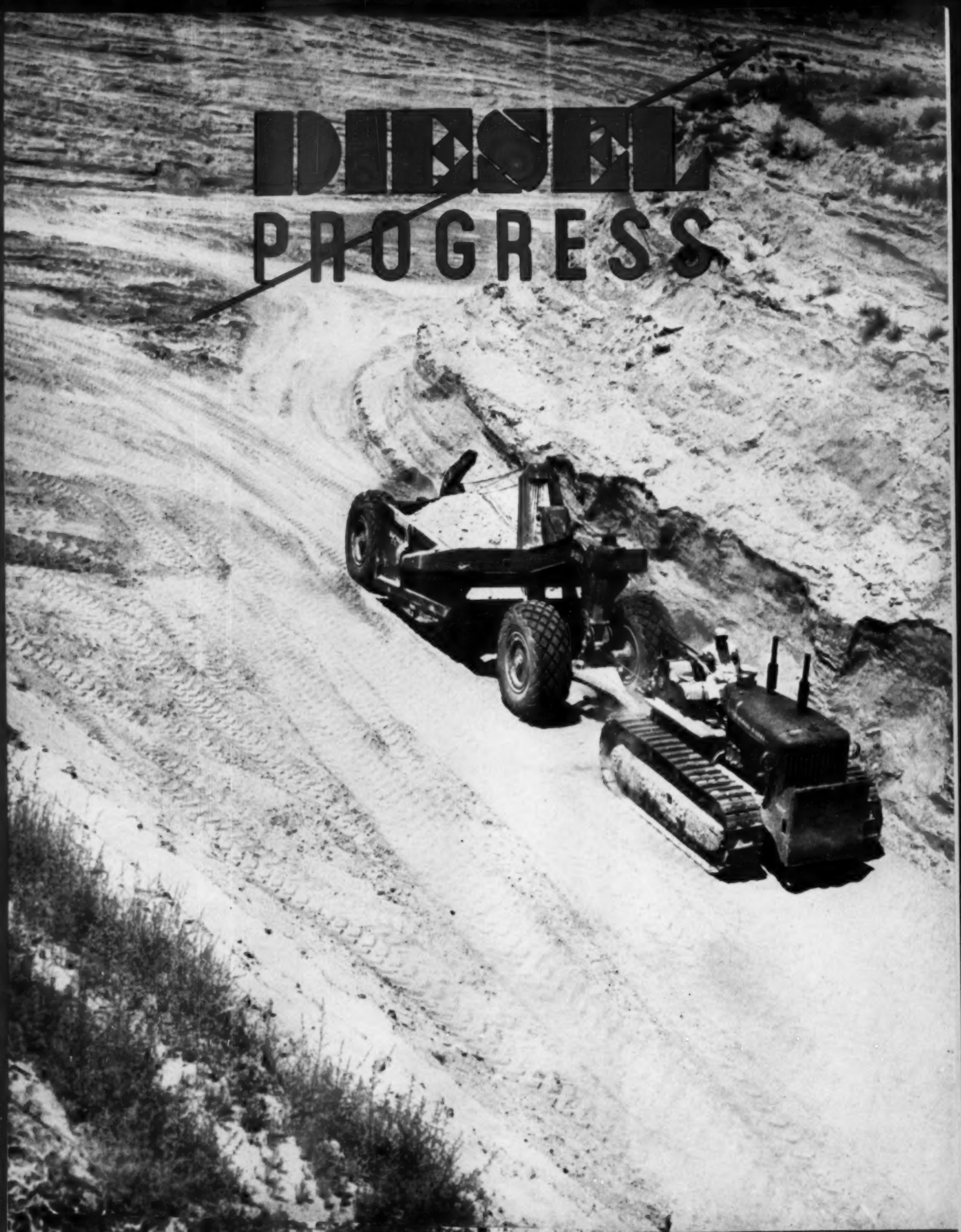
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



FIVE DOLLARS PER YEAR

JULY, 1953

FIFTY CENTS PER COPY

For 20 years— "MAINTENANCE CONSISTENTLY

WHEN the first two Diesels went into the Vermillion, S. D., power plant in 1932, *Texaco Ursa Oil* went in with them.

"The freedom *Texaco Ursa Oil* gave us from lubrication troubles," says Chief Engineer Armagost, "naturally led to our using it in other engines that were installed in 1937 and 1947. Year after year our equipment has run remarkably clean, with minimum wear and maintenance and fuel costs consistently low."

The foregoing is one more example of the year-in, year-out fine performance that operators everywhere are getting with *Texaco Ursa Oils* in Diesel, gas and dual-fuel engines.

A Texaco Lubrication Engineer will gladly tell you all about the complete line of *Texaco Ursa Oils,* and help you select the proper ones to assure top performance from your engines. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

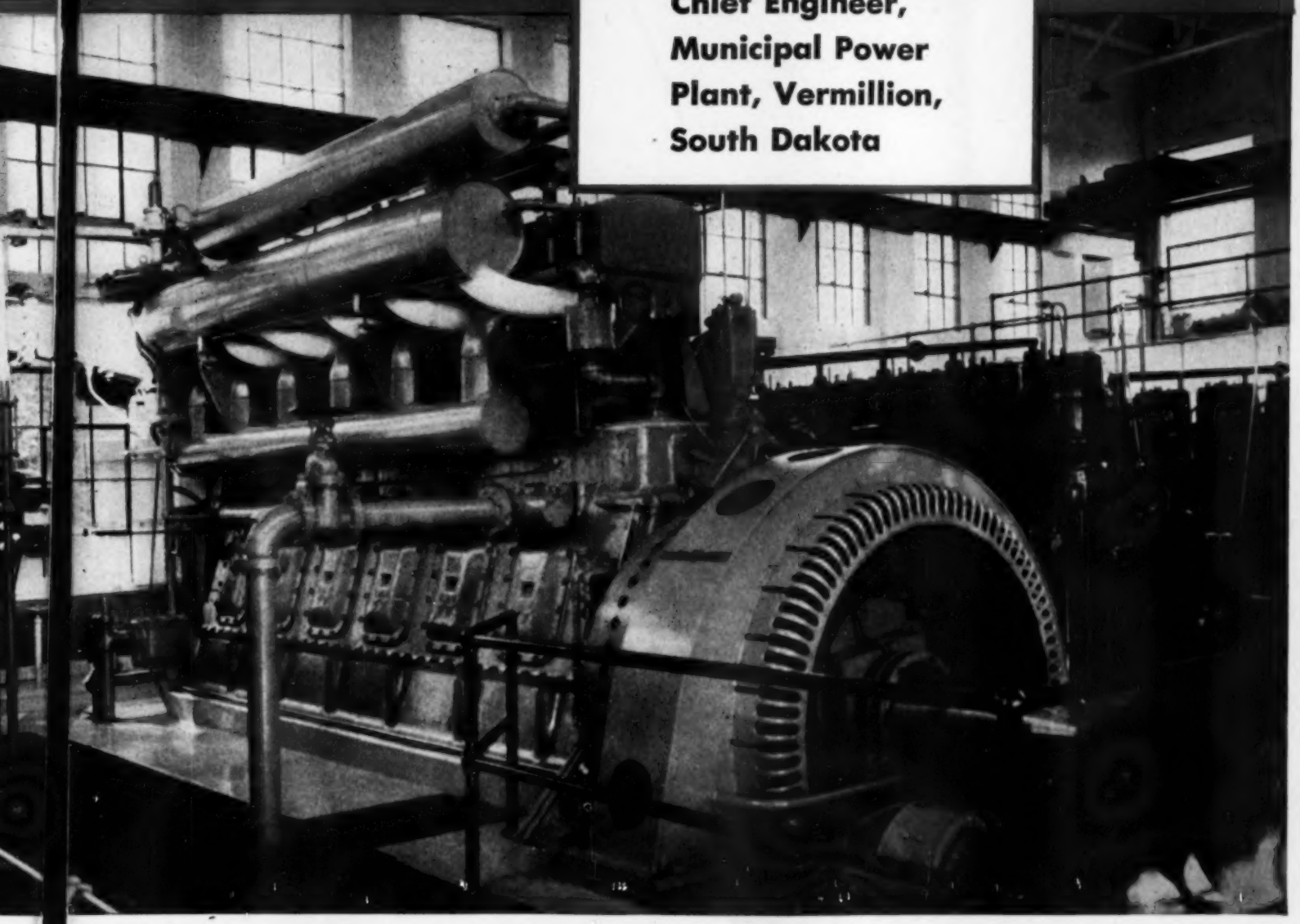
VERMILLION, S. D., Municipal Power Plant. The 750 h.p. Worthington Diesel engine shown was originally installed in 1937. It was converted to dual-fuel and stepped up to 1200 h.p. in 1949. Other engines in plant are two 525 h.p. Fairbanks-Morse Diesels installed in 1932, and a 1300 h.p. Fulton dual-fuel engine installed in 1947. Plant has been 100% Texaco-lubricated since 1932.

TEXACO

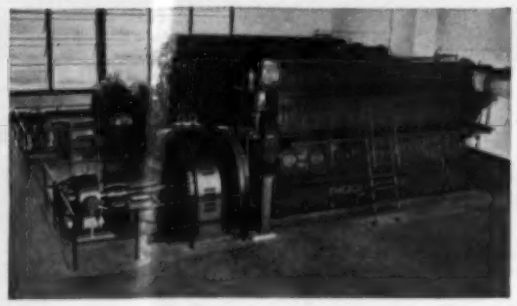
TEXACO

AND FUEL COSTS LOW"

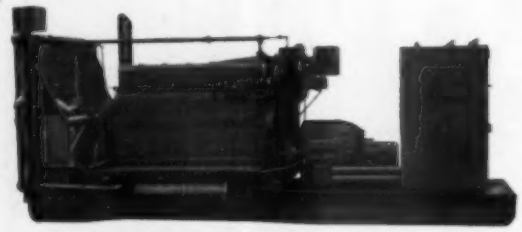
—Earl Armagost, Chief Engineer, Municipal Power Plant, Vermillion, South Dakota



URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES



Two 1000 KW units in a
Midwestern Public Utility.



500 KW Package Unit for construction work,
standby or emergency power, etc.

MORE POWER

You get tops in power performance and dependability at low operating cost with CP Diesel, Dual Fuel, and Gas Engines. Efficient CP engines are available in sizes capable of delivering from 120 HP to 1750 HP, and in normally aspirated or supercharged models.

Widely used in all types of industries where low cost reliable power is required, CP Diesel Engines are also ideally suited for utilities, institutions, sewage works, and other applications. Write for more detailed information. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

DIESEL PROGRESS for July, 1953, Volume XIX, No. 7. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 816 North La Cienega Boulevard, Los Angeles 46, California. Rex W. Wadman, President. Subscription rate: $5 per year, single copy 50c. Acceptance under 34.64, P. L. & R., authorized.

THE ENGINEER'S REPORT

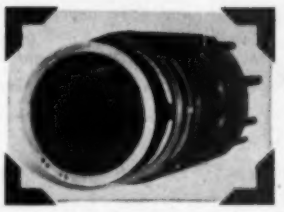
DATA

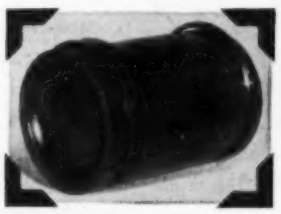
LUBRICANT RPM Delo Oil R.R.
UNIT Diesel locomotive — 65 to 12 gear ratio
SERVICE Mountain log haul on grades to 3.7%
PERIOD 3½ years
LOCATION Tacoma — Morton, Wash.
FIRM The Milwaukee Road

All liners, pistons still in use after 8800 hours!

LUBRICATED WITH RPM DELO OIL R.R., engines in the specially low-geared locomotive shown at right required no replacements of bearings, pistons or liners, no major repair work of any kind during 3½ years of hard service—more than 8800 hours of engine operation and 149,859 miles of locomotive travel. Geared at a ratio of 65 to 12, the locomotive hauls up to 134 carloads of logs out of the mountains on upgrades of 2.5%. Going in, upgrades reach 3.7%.

AFTER 48,800 MILES of constant service, this assembly was removed for inspection. It proved the low liner-wear rate: Top bore diameter was 8.5025, bottom 8.501—less than 0.002 out of round!





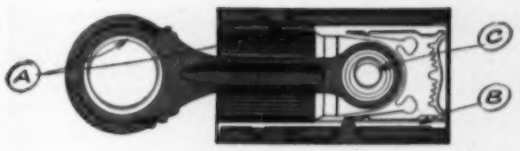
NO LACQUER DEPOSIT trouble has been encountered in the engines although they idle about 30% of the time, often in low subzero temperatures. Rings remain free, as shown in this picture.

FREE CATALOG: "How to Save Money on Equipment Operation," a new booklet full of valuable information, will be sent you on request to Standard Oil Company of California, 225 Bush St., San Francisco, Calif.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

How RPM DELO Oil R.R. prevents wear, corrosion, oxidation



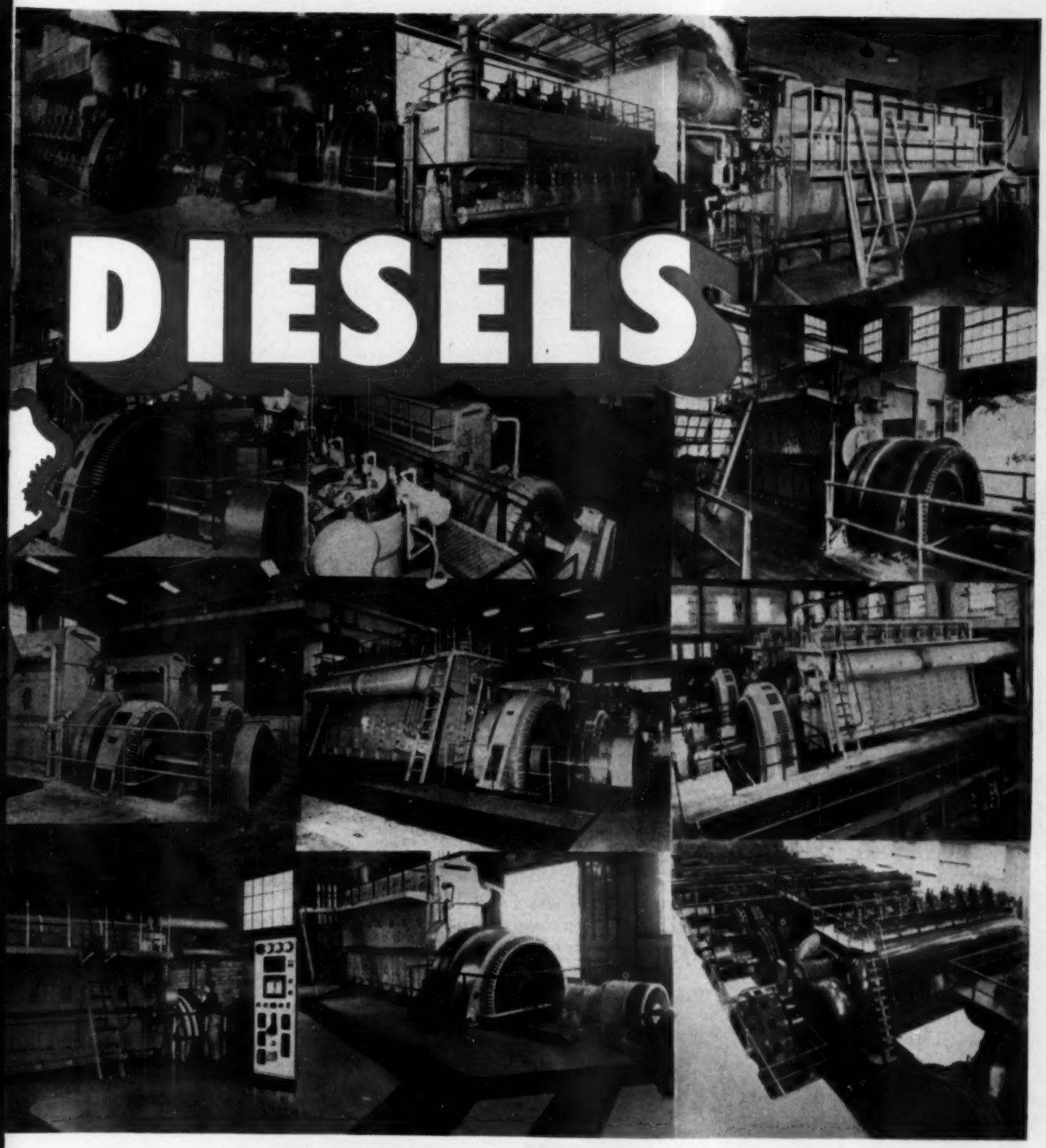
A. Special additive provides metal-adhesion qualities...keeps oil on parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent scuffing of cylinder walls.

C. Special compounds stop corrosion of any bushing or bearing metals and foaming in crankcase.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado



NORDBERG MFG. CO., Milwaukee, Wisconsin

NORDBERG

DIESEL • DUAFUEL® AND
SPARK-FIRED GAS ENGINES

P653

OPERATOR REPORTS

Production up — Maintenance down

Twenty of these Allison TORQMATIC-equipped trucks are working 21 hours a day hauling 34-ton pay loads of coal and overburden over 7½% grades.

The Wadesville Production Company operates 20 Allison TORQMATIC-equipped Euclid rear-dump trucks hauling 42,000 tons daily in its strip mine near St. Claire, Pa. These trucks boost production by making round trips 25% faster than the mechanical-drive units they replaced.

This operator's records show TORQMATIC DRIVES outlast mechanical drives — maintenance time and costs are down too. At routine overhaul periods, mechanics change out the TORQMATIC DRIVES in 2 hours less time than they change out a mechanical drive.

You, too, can cut your heavy-duty equipment operating costs by specifying Allison TORQMATIC DRIVES the next time you buy. Ask your equipment dealer, manufacturer or write:

ALLISON *Division of* GENERAL MOTORS
Box 894DD, Indianapolis 6, Indiana

ALLISON TORQMATIC DRIVES

Unbeatable Team for Maximum Operating Economy

- *Quick-shifts* at full throttle with fingertip hydraulic control.
- *Holds* power to load at all times — no clutch pedal to push—no gearshift guess.
- *Cuts* maintenance cost by absorbing shock—eliminates engine lugging—prolongs equipment life.
- *Only* torque converter-transmission team designed to work as a unit and built by one manufacturer.

MATCHED UNITS BUILT BY ONE MANUFACTURER

Allison TORQMATIC DRIVES

COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES • TRUCKS • TRACTORS • SHOVELS • SCRAPERS • DRILLING RIGS

ALCO DIESEL ENGINES

...dependable power for your purpose

Whatever your power requirements, you can depend on Alco Diesels.

You can depend on their high operating efficiency, their low long-run cost.

For Alco Diesels are designed and built with industry's needs in mind—and with the skill gained through many years of working closely with users of diesel engines the world over.

Applications for Alco Diesels are many. They include municipal power stations, oil pipeline pumping stations, marine power, and emergency stand-by service. They include, in fact, any application calling for an economical source of dependable diesel power.

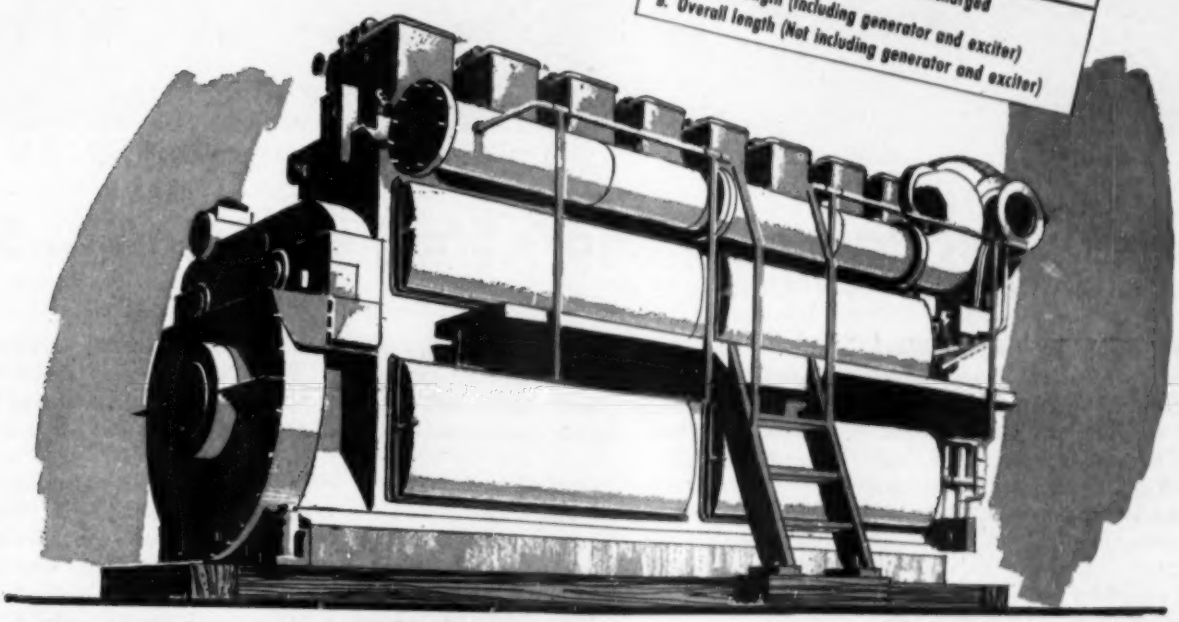
Your Alco sales representative will be happy to give you further information on Alco Diesels. You can contact him at Beaumont, Chicago, Cleveland, Houston, Kansas City, New York, San Francisco, Schenectady or St. Louis.

ALCO Engine Specifications

Type	6-12½x13		8-12½x13		*6-12½x13-T		*8-12½x13-T	
RPM	600	720	600	720	600	720	600	720
BHP	540	650	720	865	810	975	1080	1300
Bore	12½"		12½"		12½"		12½"	
Stroke	13"		13"		13"		13"	
A	20'-6½"		24'-9¼"		23'-6"		26'-8½"	
B	12'-11¾"		16'-8¼"		13'-4"		17'-3"	
Height	5'-0"		6'-8½"		5'-10½"		6'-1½"	
Width	20½"		21¼"		19½"		21"	

*Turbocharged

A. Overall length (Including generator and exciter)
B. Overall length (Not including generator and exciter)



ALCO DIESELS

AMERICAN LOCOMOTIVE COMPANY
SCHENECTADY, N. Y.

Alco

THE MARK OF MODERN ENGINEERING

Complete Power Package...that's Smaller...Lighter...Shorter

From a Background of More than 5 Million ... horsepower of successful Opposed-Piston performance, Fairbanks-Morse now presents the new Model 38F 5¼ Opposed-Piston Diesel. This new engine is ideal in size, power, and compactness for all generating, direct drive and marine applications in the 300 — 750 horsepower class of service.

It's Smaller . . . Lighter . . . Shorter . . . than any diesel in its class. O-P design principles applied to this model produce an engine that is 20% lighter, 20% shorter than *any* engine of its speed and horsepower. All steel construction assures greater rigidity and shock resistance for the toughest applications—even portable service.

Complete Power Package . . . all accessories are engine mounted. On this engine, oil cooler, radiator or heat exchanger, generator or gear reducer, controls—all can be mounted on a common base. It is truly a compact . . . complete power package.

All Opposed-Piston Advantages . . . Plus . . . the many improvements that Fairbanks-Morse engineering has worked into this design. As in the large O-P, this unique principle means an engine with fewer parts to wear, maintain and replace. 2-cycle dependability and economical operation at all loads. Plus the many improvements made—not scaled down parts from larger engine. Be sure you ask your nearby F-M Diesel Specialist about the new Model 38F 5¼—soon! Fairbanks, Morse & Co., 600 South Michigan Avenue, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY
PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

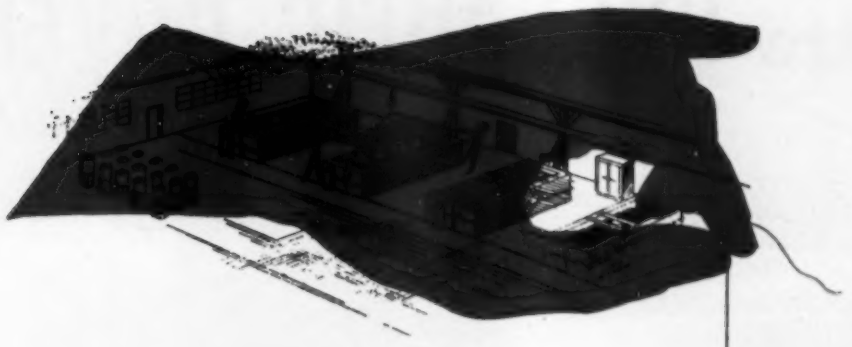
21,000 hours young!

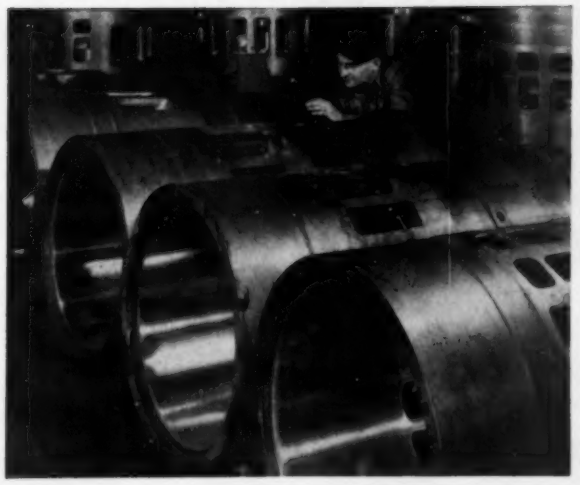
● This 1320-hp diesel engine has provided many hours of economical service for the City of Benson, Minnesota, Water and Light Department since it was installed in October, 1948. It has been operated on an average of 20 hours each day and has generated over 13 million KW at an average load factor of 75%.

In this hard-working diesel, the lubricating performance of STANDARD HD Oil has been outstanding, particularly in view of the fact that crude oil has been used as fuel. Visual evidence of the clean, protective lubrication provided by STANDARD HD is presented in the above unretouched photograph of a piston removed from the diesel after 21,000 hours' operation. Deposits are at a minimum; rings are free. The original fill of STANDARD HD has not been changed, yet a recent examination and analysis of the oil showed it to be in excellent condition.

Diesel operators throughout the Midwest are receiving service like this from STANDARD HD Oil. The Standard Oil lubrication specialist serving in your section of the Midwest will be glad to give you information about the use of STANDARD HD in plants near your own. Just phone your local Standard Oil office. Or, write: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY STANDARD *(Indiana)*





Replace the Atom!

Atoms disappear from the working surfaces of expensive Diesel liners until they are reduced to scrap. Worn out, you say? Let Van der Horst replace the atoms and your liners (or compressor cylinders) are new again.

We use VANDERLOY M, an electrolytic iron with a bond that's stronger than most cylinder metals. Atom by atom, we plate it to whatever thickness may be needed to renew the bore.

Then we finish-plate with PORUS-KROME*—which keeps its atoms on the job as much as four times longer than the kind they replace.

These superior Van der Horst atoms cost less than buying new parts. May we quote you?

W32-2D

* *PORUS-KROME is a dense, hard, wear and corrosion-resistant chromium, produced by the Van der Horst Corporation of America, and which gives working surfaces an infinite number of tiny oil-retaining reservoirs for perfected lubrication.*

U. S. PATENTS 2,048,578, 2,314,604 and 2,412,698

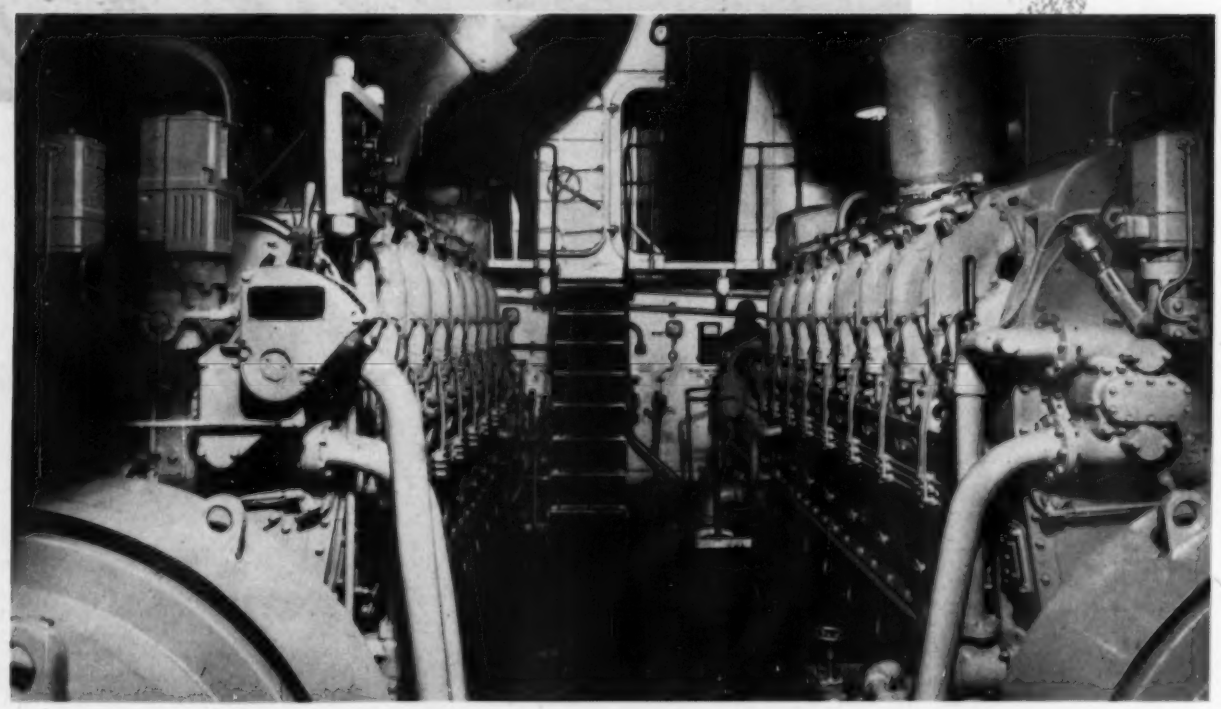
VAN DER HORST

VAN DER HORST CORPORATION • OLEAN, N. Y.

Keeping channels open
for tankers in South America...

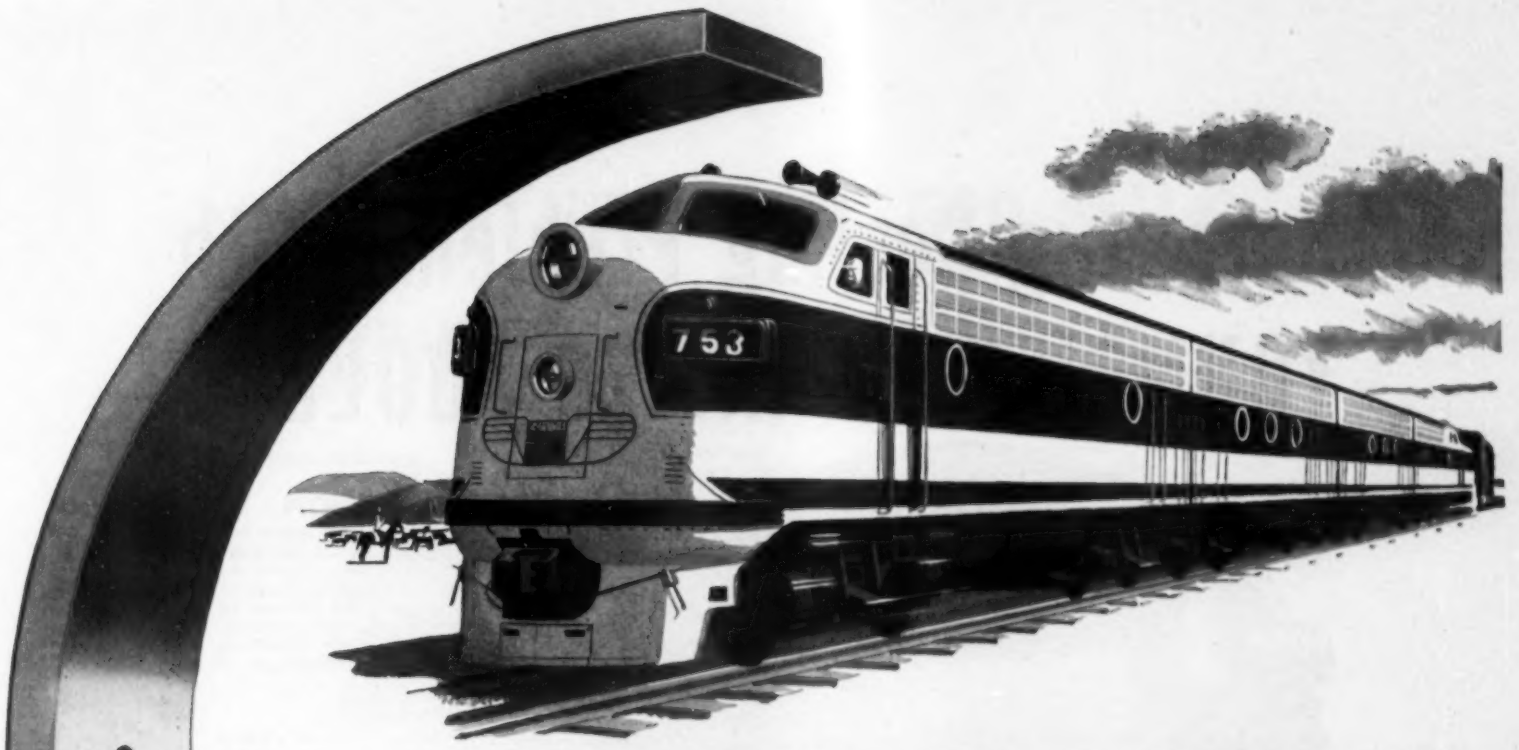
Marquette HYDRAULIC GOVERNORS

regulate the main engines on
Diesel electric dredge "Sandpiper"



The Marquette
METAL PRODUCTS CO.
CLEVELAND 10, OHIO
SUBSIDIARY OF CURTISS-WRIGHT CORPORATION

Also Manufacturers of
ROLLER BEARING TEXTILE SPINDLES
WINDSHIELD WIPERS FOR AIRCRAFT
FUEL OIL PUMPS AND INJECTORS
PRECISION PARTS AND ASSEMBLIES
HEAVY DUTY PACKERS OIL FIELD PUMPING EQUIPMENT



Alcoa Aluminum Bearings Lower Diesel Maintenance

Aluminum bearings lower diesel maintenance because they're naturally corrosion-resistant, take condensate and acid oils in their stride. Solid bearing metal all the way through, their one-piece construction eliminates bond failure that causes down-time.

You're maintenance dollars ahead with aluminum bearings cast from a specially developed bearing alloy by Alcoa. These sound, high-quality castings are finished and sold by leading bearing manufacturers, used by the best builders of diesel engines. Aluminum Company of America, 1987-G Alcoa Building, Pittsburgh 19, Pennsylvania.

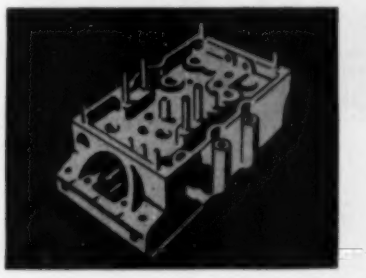
Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

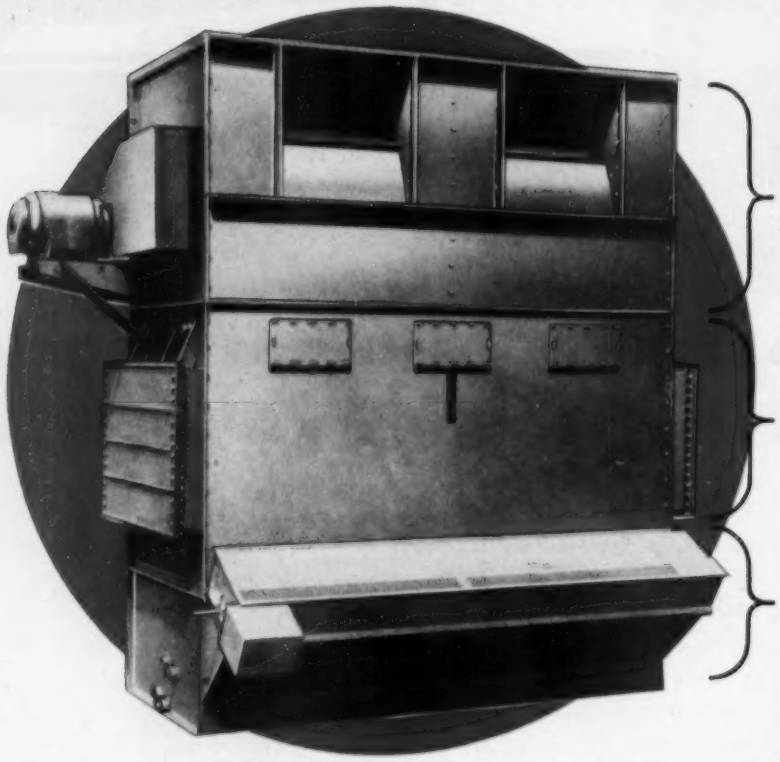
CRANKCASES AND FRAMES of lightweight Alcoa Aluminum mean lighter weight to horsepower ratios for diesel engines.

SUPERCHARGING AND SCAVENGING are more efficient through the use of aluminum. Here, too, diesels save weight.

CYLINDER HEADS of Alcoa Aluminum distribute heat faster, allow increased engine ratings, easier servicing.



Solve Big Cooling Problems with YOUNG EVAPORATIVE COOLERS



BLOWER SECTION

Built as a complete unit, this section consists of dynamically balanced multi-blade centrifugal blower, outlet scrolls for the blower housing, standard NEMA splash-proof motor, variable V-belt drive and air discharge duct. The blower fan is corrosion-resisting, double inlet design, dynamically balanced for long life, quiet operation.

COIL SECTION

Cooling coil section consists of straight, round, seamless tubes—copper, stainless steel or red brass—each rolled into header plates with baffles for multi-pass flow. Gasketed tank cover plates are used on coils for water and oil cooling. Tubes for cooling gases are rolled into steel tank headers with plugs opposite each tube for easy cleaning. Assembly also includes spray header, spray nozzles, moisture eliminators and inspection windows.

SUMP SECTION

The bottom, or sump section, consists of a water-tight, galvanized and rust-resistant reservoir for makeup and spray water, self-regulating float valve, and thermostatically controlled automatic shutters for the air inlet, air outlet, or both. The float valve automatically provides the volume of makeup water required to compensate for water losses due to evaporation and wastage. Full length access door in sump tank for ease of service, and cleaning sump.

COOL— Jacket Water . . . Steam . . . Lube Oils . . . Natural Gas

For maximum heat transfer efficiency, select Young Evaporative Coolers to solve your big cooling problems. Versatile in design and completely self-contained, YEC units cool the liquid or gas in the coil by evaporation when water is sprayed over the coil assembly. Units are used primarily for cooling engine jacket water and lubricating oil (gas, gasoline, Diesel engines), steam, compressed air, natural gas or other fluids, and also for condensing steam, hydrocarbons, etc.

Designed and engineered to give long, efficient performance, Young Evaporative Coolers are built in six basic models, either with single or two coil assemblies. Normal operating pressures of 100 psig

CONDENSE— Hydrocarbons . . . Steam . . . Other Fluids

are used for water and oil cooling. However, for steam and natural gas cooling and condensing, pressures up to 2000 psig can be handled. Unit capacities range from 876,000 to 8,712,000 Btu's per hour.

Coil assemblies for water, oil and gas service consist of straight, round, seamless copper, stainless steel or red brass tubes, each rolled into thick header plates at each tank with multipass baffles. Oil cooling units use chain-type agitator strips inside the tubes to increase heat transfer. Straight Admiralty tubes in the Gas Cooler coil assembly are rolled into steel tanks with a plug opposite the end of each tube for easy cleaning. For special cooling jobs, call on a Young Representative, or write direct.

Young Quality

GET THIS NEW CATALOG!

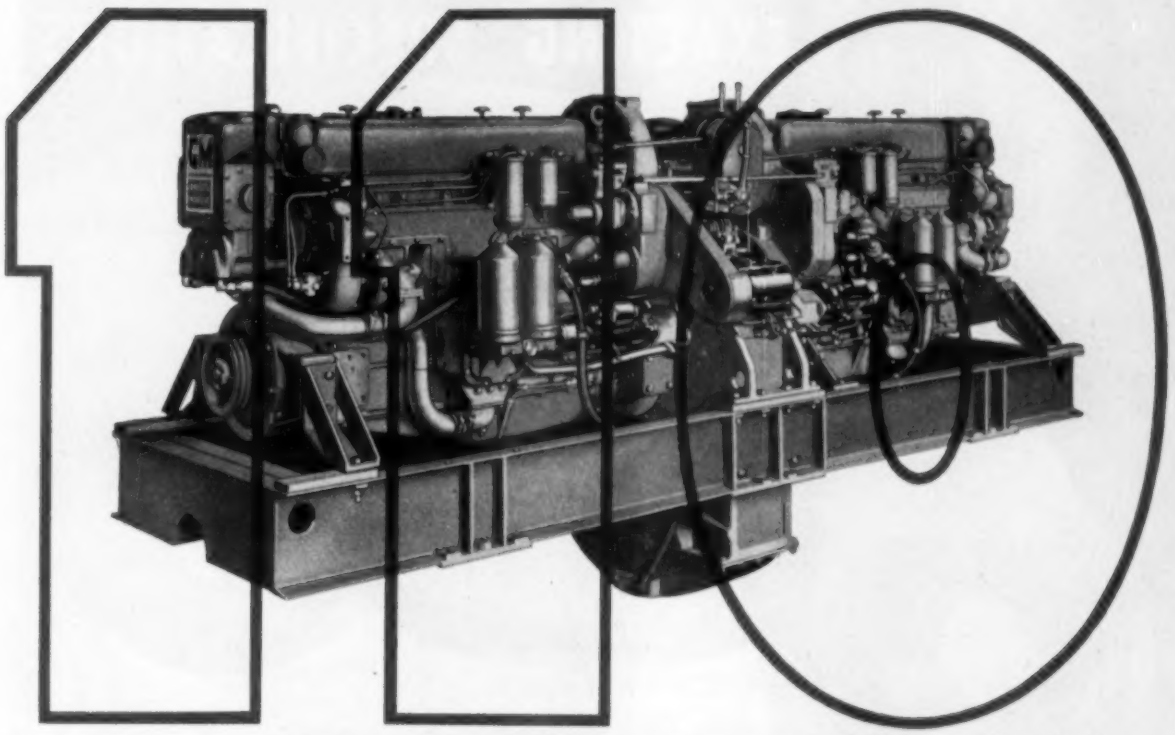
Illustrated Catalog No. 1932 gives specifications, dimensions, capacities and features of YEC units.

YOUNG . . . AN "OLD" NAME IN HEAT TRANSFER ENGINEERING

YOUNG RADIATOR COMPANY

Dept. 403G • Racine, Wisconsin • Factories at Racine, Wisconsin and Mattoon, Illinois

NOW—A NEW 409—530 S.H.P. GENERAL MOTORS DIESEL



The "110" Tandem Twin

★ ***409 Continuous Shaft Horsepower***

★ ***20% to 40% Lower Cost***

★ ***Twin Engine Dependability***

★ ***Clean, Compact Lines—Lighter Weight***

Meet the newest member of the General Motors Marine Diesel family—the power-packed "110" Tandem Twin.

Now you can have the *double dependability* of a more powerful GM Diesel Twin—530 horsepower for pleasure craft—a full 409 horsepower at the shaft for round-the-clock, heavy-duty work in tugs and fishing boats.

Like all GM Diesels, this new "110" Twin operates on the *2-cycle* principle—delivers smoother, steadier, more responsive power. It's more flexible, too, because you can shut off one of the engines when not needed. One engine running alone will propel a single-screw boat at 80% of its normal speed.

The slim, low silhouette of its tandem arrangement lets this unit fit in a smaller engine room, leaves more room, more space for fuel and pay load. And its clean, simple design, with ready accessibility for servicing, means easier, lower-cost maintenance. Its parts cost much less too.

But the big news is its low price. Here's a reserve of GM's time-proved Diesel power in a compact, lightweight marine unit that gives you the extra dependability and safety of twin engine operation—all at a price that's 20% to 40% less than any other Diesel of comparable power.

The new "110" Tandem Twin is available with port or starboard rotation; finger-tip GM hydraulic reversing; reduction gears up to 6:1; front power take-off for either engine and push-button electric starting. Your local GM Diesel distributor will gladly give you full details. Call him today, or write us for complete specifications.

Single Engines . . . 16 to 275 H.P. Multiple Units . . . Up to 840 H.P.

GM DIESEL POWER

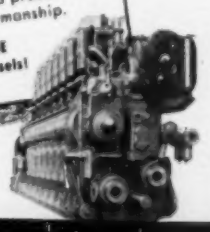
DETROIT DIESEL
ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN

Every Gallon of Oil *goes further*

Check these points on the Enterprise Positive Pressure Lubricating System

- ✓ Complete pressure lubrication to all moving parts.
- ✓ Fully automatic—no dependence on hand oiling.
- ✓ Proven piston and ring design saves oil, prevents "blow-by" of exhaust gases to cylinder liner.
- ✓ Tested metallurgical compatability of component parts.
- ✓ Long engine life and low wear factor are primarily the combined results of a totally effective lube system, a superior diesel design, and precision methods, control and craftmanship.

For the best, SPECIFY ENTERPRISE —none finer in heavy-duty diesels!



Reported ENTERPRISE lube oil consumption over 15,000 BHP hours per gallon*

It's no accident that a little lube oil goes a long way with these rugged engines. A lot of time, testing and engineering skill has gone into successful design development at ENTERPRISE these past 33 years. The result? Tolerances, clearances and surface finishing of the potentially wearable parts are such that we have minimized the work that lube oil must do. This, then, in addition to considerable savings in lube oil consumption, reduces engine wear, adds years to engine life, saves on repairs, parts and overhaul work.

Here is another of the many plus values enjoyed by ENTERPRISE customers the world over. Get the facts and the chances are that *your* choice, too, will be ENTERPRISE.

*Recent unsolicited reports from eight ENTERPRISE power plant installations showed an average of 15,112 BHP hours per gallon of lube oil.

Write for new descriptive bulletins, or call your nearest ENTERPRISE *Diesel Sales Office.*

G GENERAL METALS E ENTERPRISE

Enterprise DEPENDABLE Diesels

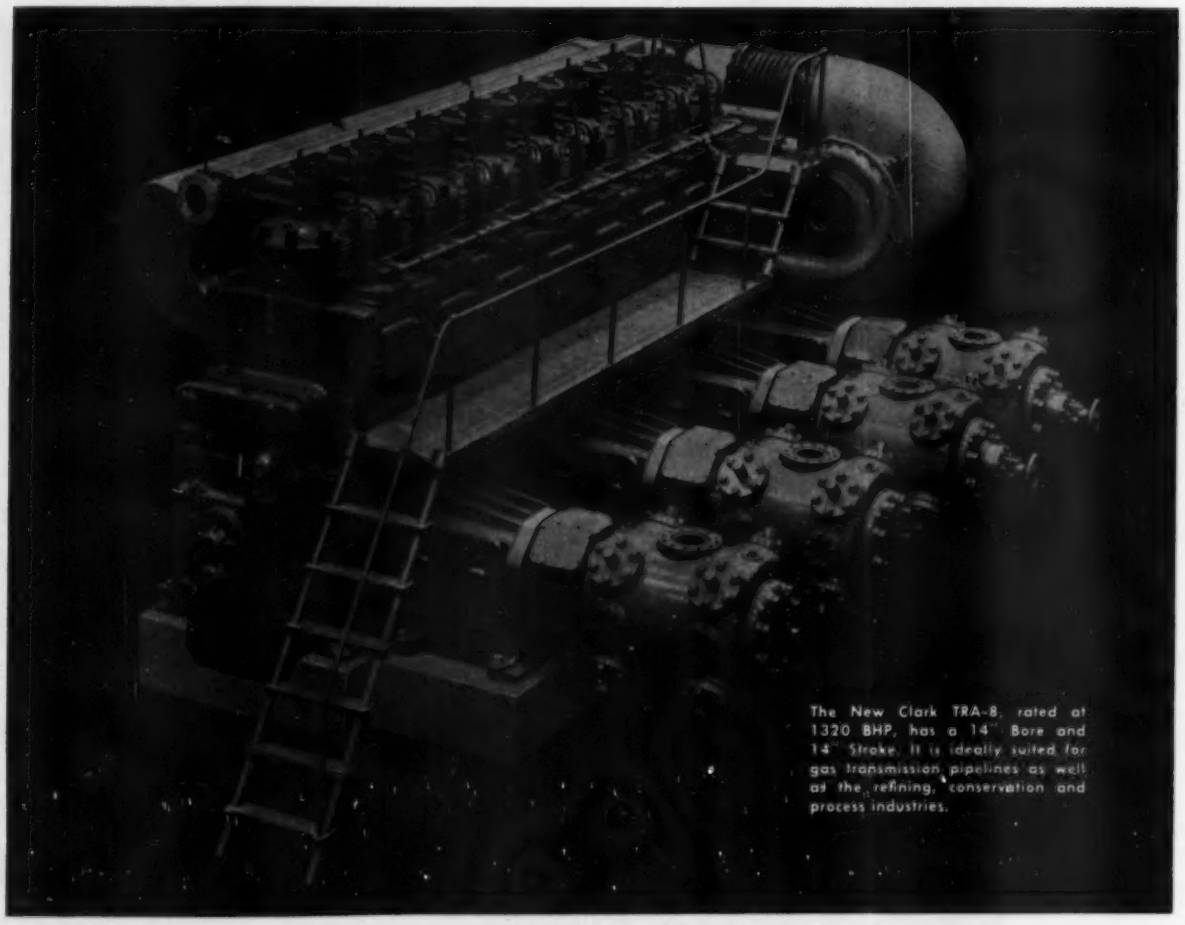
18th & Florida Streets, San Francisco 10, California

Boston · Chicago · Denver · Ft. Worth · Kansas City · Los Angeles
New Orleans · New York · San Diego · San Francisco
Seattle · St. Louis · Washington, D.C.

DIESEL ENGINES • OIL BURNERS • PROCESS MACHINERY

ITS HERE! a

The NEW Clark 2-Cycle



The New Clark TRA-8, rated at 1320 BHP, has a 14" Bore and 14" Stroke. It is ideally suited for gas transmission pipelines as well as the refining, conservation and process industries.

Clark Continues to Set the Pace in Compressor Progress

revolutionary compressor development!

Turbo-Charged "Right Angle"

It's here — after seven years of intensive development. Clark revolutionizes compressor design with the first 2-Cycle Turbo-Charged Gas Engine Driven Compressor . . . the TRA. Another Clark first! A precedent-shattering development that makes possible —

50% MORE POWER
Developing 1320 bhp, the TRA-8 delivers 50% more power than any comparable compressor, with *no* encroachment on overload carrying ability.

SHARPLY REDUCED FUEL CONSUMPTION
The TRA is conservatively rated *and guaranteed* to burn substantially less fuel than *any* gas engine driven compressor now built.

25% LESS COOLING WATER LOAD
(Including scavenging air intercooler load.) Vast amounts of waste heat are recovered from the exhaust gases by the Clark Turbo-Charger and are converted to useful work.

FLAT FUEL CONSUMPTION CURVE
Fuel consumption remains practically constant over a wide range of load conditions.

QUIET
Energy goes into power, rather than noise. Much quieter than a conventional gas engine driven compressor. No exhaust pulsations.

UNPRECEDENTED RUGGEDNESS
Tremendous stamina, unapproached by any other compressor design. Conservative BMEP rating.

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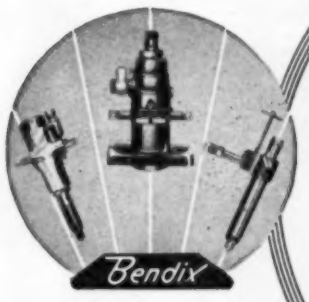

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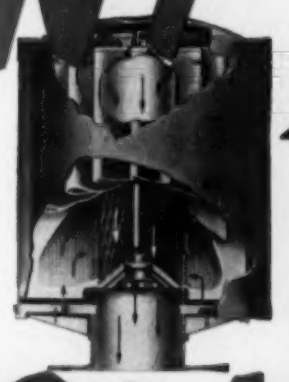

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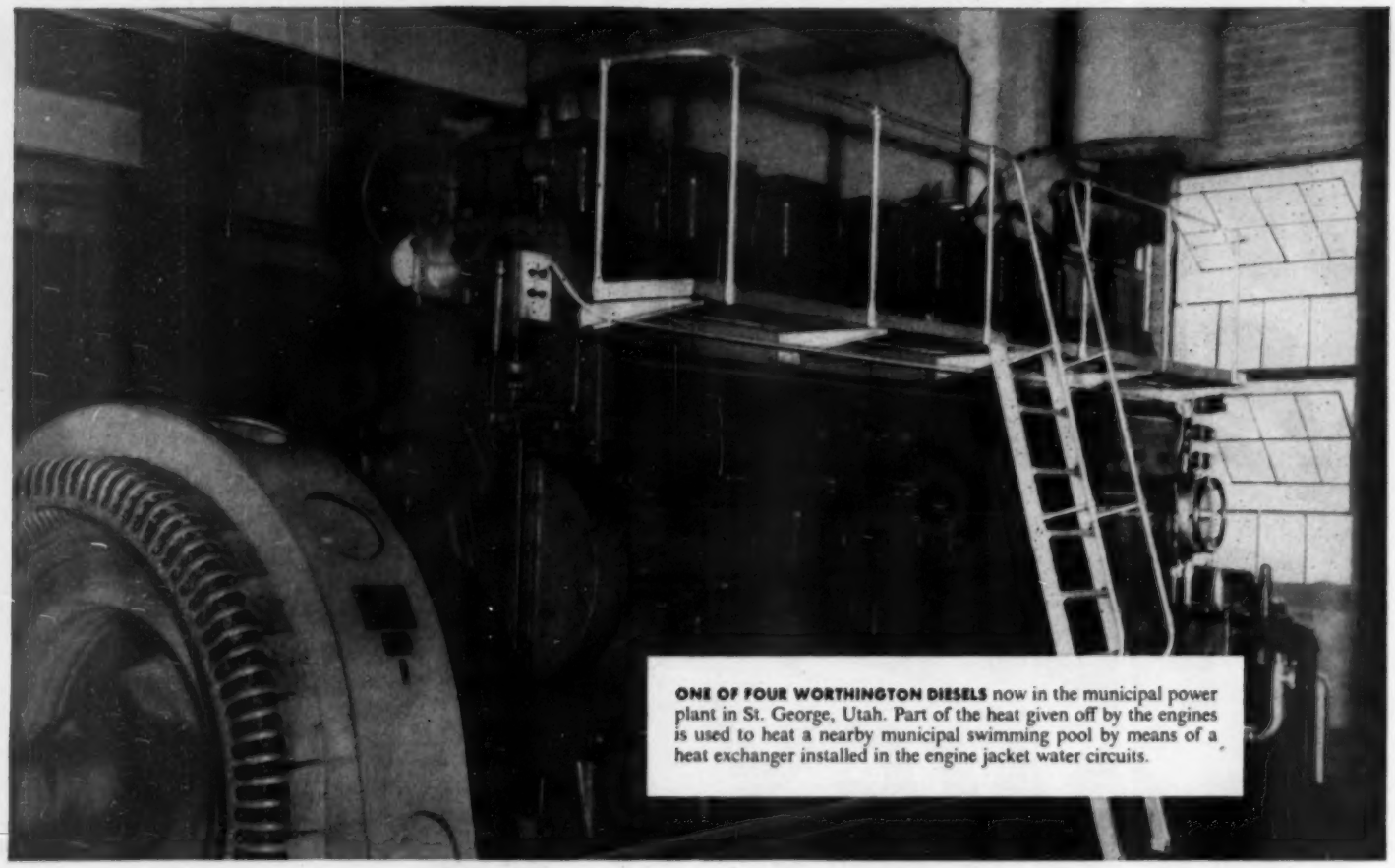

ONE OF FOUR WORTHINGTON DIESELS now in the municipal power plant in St. George, Utah. Part of the heat given off by the engines is used to heat a nearby municipal swimming pool by means of a heat exchanger installed in the engine jacket water circuits.

WORTHINGTON HELICAL STEEL GEAR TRAIN
used on these Worthington dual fuel engines . . .

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Good planning keeps municipal power plant profitable

Eleven years ago, the City of St. George, Utah, started power-plant operations with two Worthington four-cycle, direct injection Diesel engines. Today, the capacity of St. George's plant is 500% greater than it was in 1942—and profits are still being returned to the City of St. George.

St. George planned its power plant to keep pace with increasing power needs and to continue to show profits. That's where Worthington came in. Worthington engineers helped St. George select exactly the right size and type of equipment—engines, circulating water pumps, fuel transfer pumps and air starting equipment.

Because of its complete satisfaction with the original Worthington units, St. George purchased a third Worthington Diesel in 1947, a fourth in 1949, and a fifth in 1950. At present a total of four units are in operation, one unit having been replaced by a larger unit in 1950.

Worthington may be able to help save power costs for your community, too. Write your nearest Worthington district office or Worthington Corporation, Engine Division, Section E.3.2, Buffalo, New York. E.3.2

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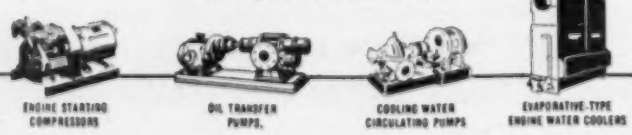

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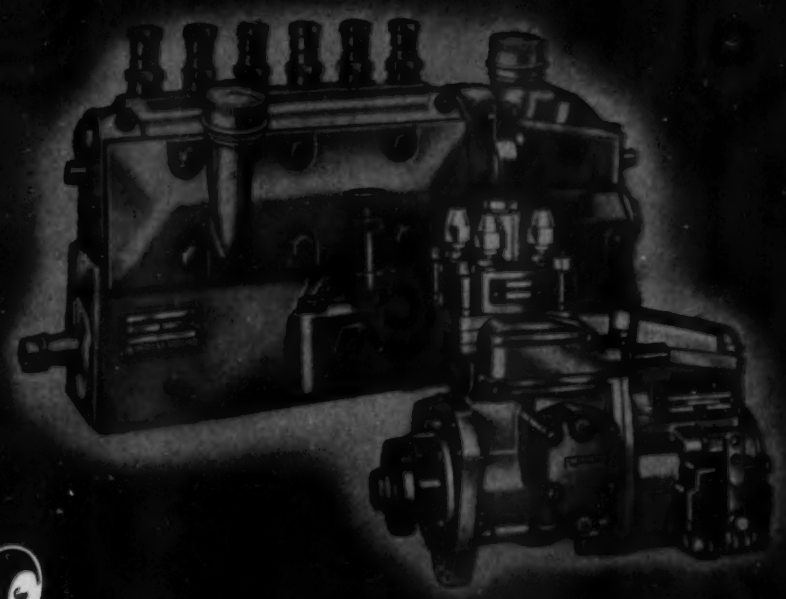


First in diesel fuel injection

"First in the past, first today, first in the future . . . because American Bosch knows more about diesel fuel injection than any other manufacturer.

IMAGINATION APPLIED TO CIVIL DEFENSE

The Northern States Power Company Has Applied Vivid Imagination to Solving The Problem of Providing Sufficient and Efficient Stand-By Service Throughout Their Huge Territory To Meet Ordinary and Extraordinary Catastrophes

By DOUGLAS SHEARING

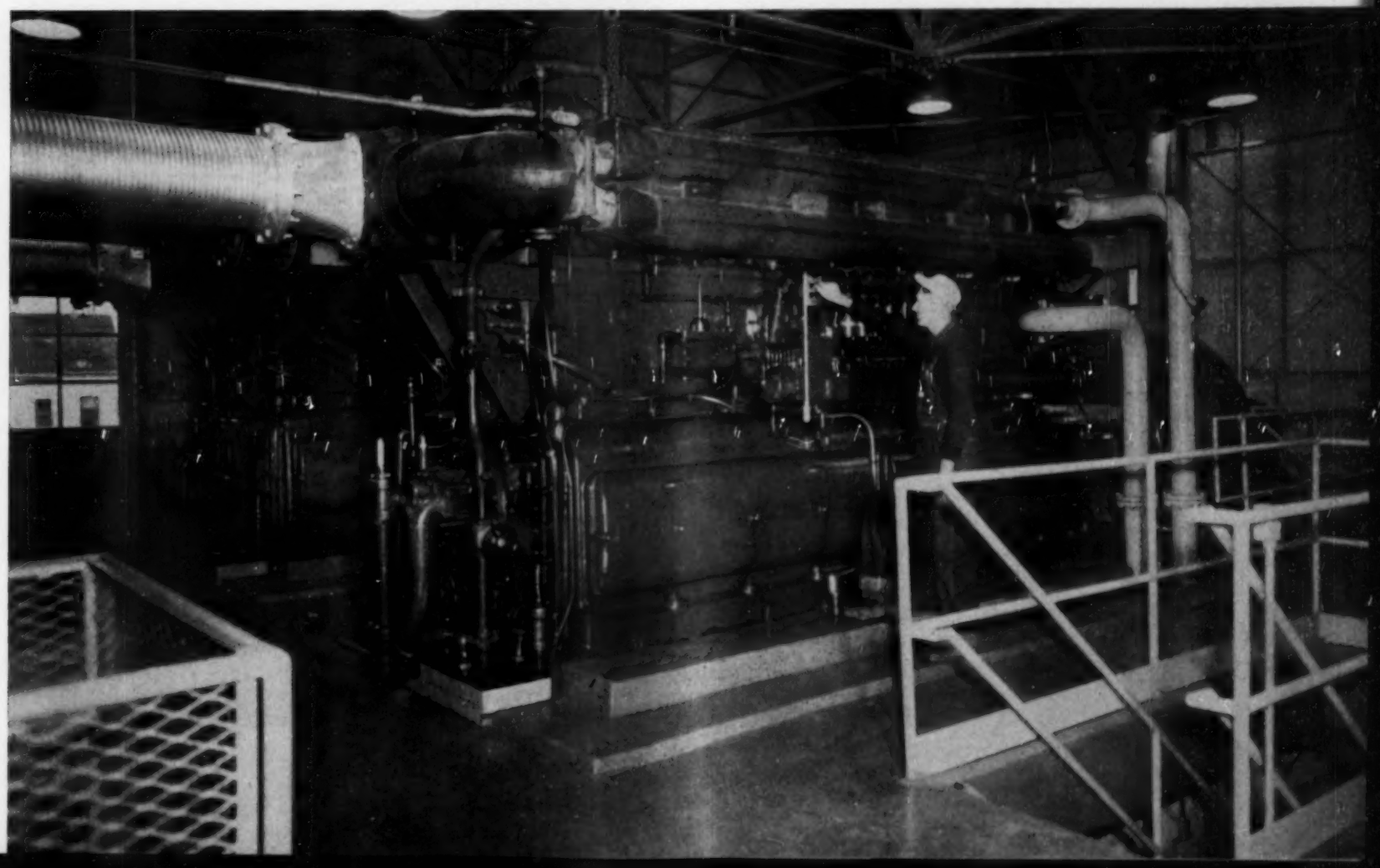
DIESELS are performing an important function in the extensive power system of the Northern States Power Company, providing standby service, helping to carry peak loads and facilitating line and substation repairs. This utility system, which spans the state of Minnesota and extends into Wisconsin and South Dakota, depends primarily on steam and hydro-electric generating facilities which still produce more than 99 percent of all kilowatt-hours. However, when the company made a survey in 1946 to determine the best means of meeting the rapidly expanding demand, it was decided that diesel plants could be utilized advantageously at many strategic locations. Implementing this decision, Northern States constructed ten stationary power plants with 27 diesel engines, 12 of which were supplied by the American Locomotive Company and are described in some detail in this particular article and 15 were supplied by the General Motors, Cleveland Diesel Engine Division, and are of the 16 cylinder, Model 567 type, rated at 1000 kw. The Alco engines are direct connected to Elliott generators. This article is devoted to describing just one of these plants, namely the Dodge Center, Minnesota installation. On a later date we hope to bring you one of the installations devoted to the Cleveland Diesel engine.

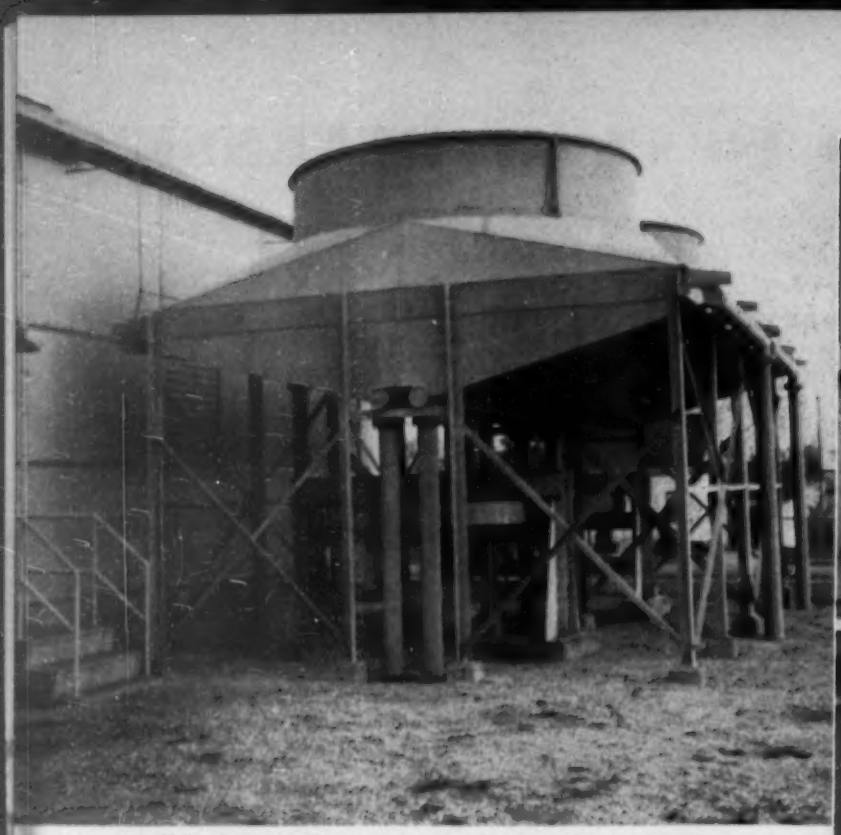
Sites for the plants were chosen carefully to facilitate plant operation and to obtain maximum value from the new facilities. Each installation was tied in with an existing distribution substation and the generators, producing at either 2300 or 4160 volts, could be connected to the distribution feeder bus. In case of a line outage, the local plant could supply power for the surrounding area. The direct connection also helped to relieve overloaded transmission lines and transformers and served to maintain voltage in localities distant from the main generating stations.

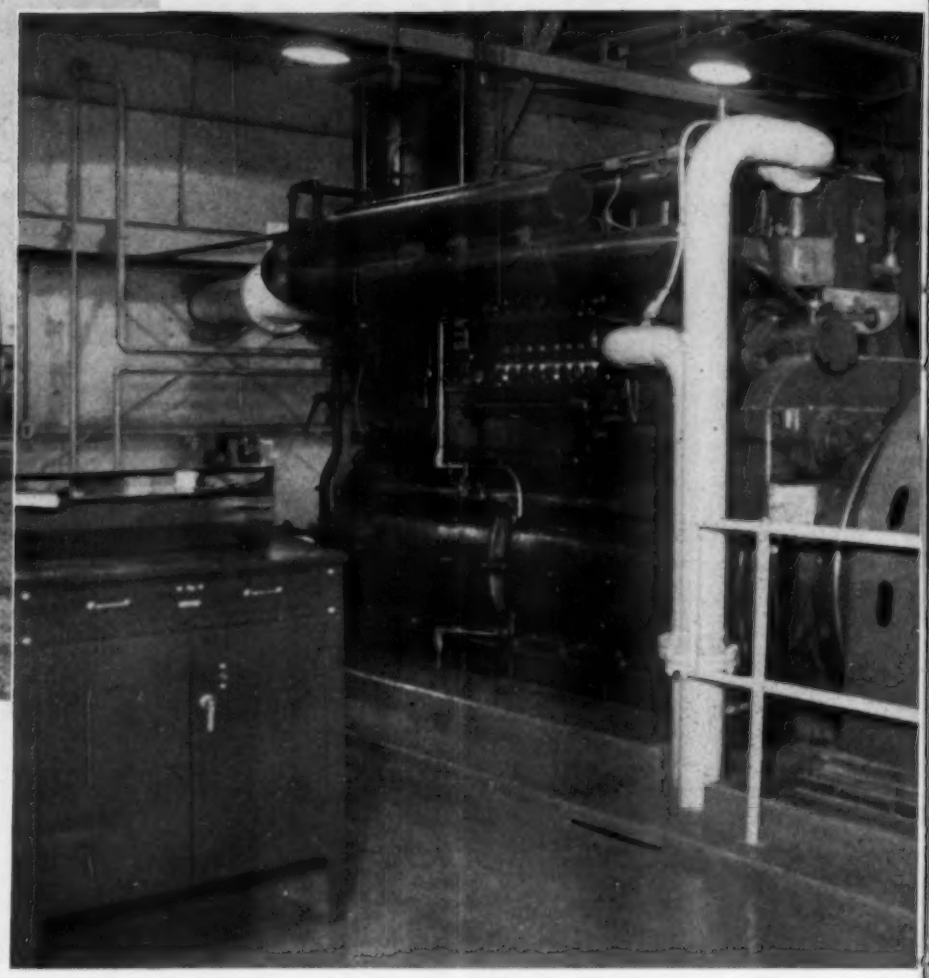
Another factor in choosing the site of each plant was the availability of operating personnel. Since these engines were intended for intermittent service, it was thought desirable to use company men with other regular jobs to run the diesels when necessary. The operators trained for their new part-time jobs included truck drivers, substation operators, linemen, gas plant operators, trouble shooters, laborers and district superintendents. Although most of these men had no previous experience in diesel plant operation, the company reports general satisfaction with the use of this kind of personnel. The economic advantages are obvious. Maintenance in all the stations is handled by a man from headquarters in Minneapolis with the help of the local operators.

The plant at Dodge Center, Minn. presents a typical picture of the operation and service of Northern States' diesel standby plants. Dodge Center is at the extreme end of a transmission loop and the diesels are well located to afford standby protection to the surrounding area in case of line failure. The plant has been used to maintain local service while a transmission line was being rebuilt. This meant not only better service for the consumer but smaller construction cost for the company and maximum working safety for the line crews. Dodge Center's

The operator adjusts the Woodward governor on one of the two Alco diesels at Dodge Center. For the most part, the company utilized operators with other jobs and trained them to handle the diesels. When not in operation, plants are unattended.







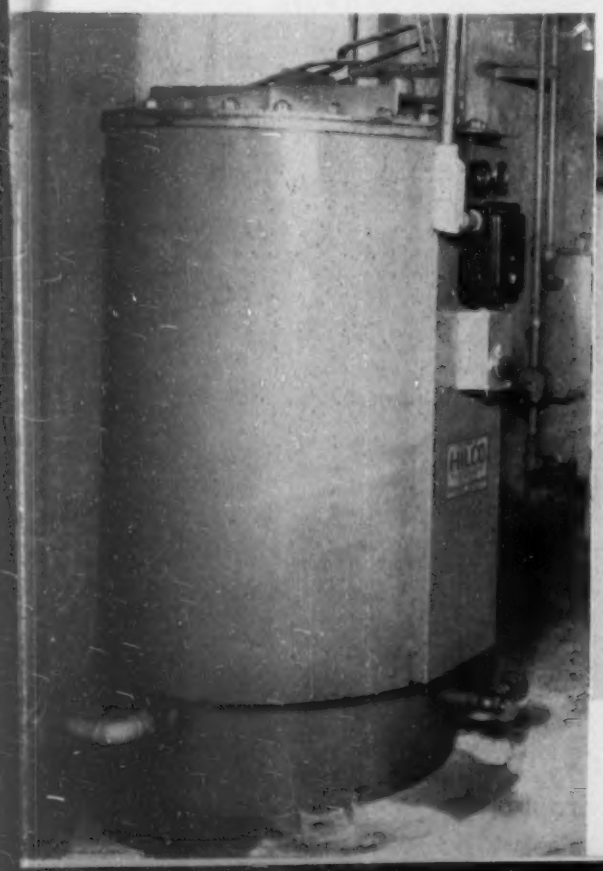
At all 10 plants, whether they use Alco diesels or GM diesels, coolant for the engines is circulated through Alco air-cooled heat exchangers, one to an engine. In winter, a 50% solution of ethylene glycol anti-freeze is used.

Northern States Power Company uses 27 diesels in 10 stationary power plants for standby and peaking service and to facilitate repairs of distribution lines. 12 of these diesels are American Locomotive rated at 1300 hp. at 20 rpm., and 15 of them are from General Motors' Cleveland Diesel Engine Division and are 16 cylinder units, rated at 1000 kw. Shown here are two 1300 hp. American Locomotive engines at the Dodge Center plant. Each Alco drives a 920 kw. Electric Machinery generator. Each GM Cleveland diesel drives a 1000 kw. Elliott generator. Alcos are pictured.

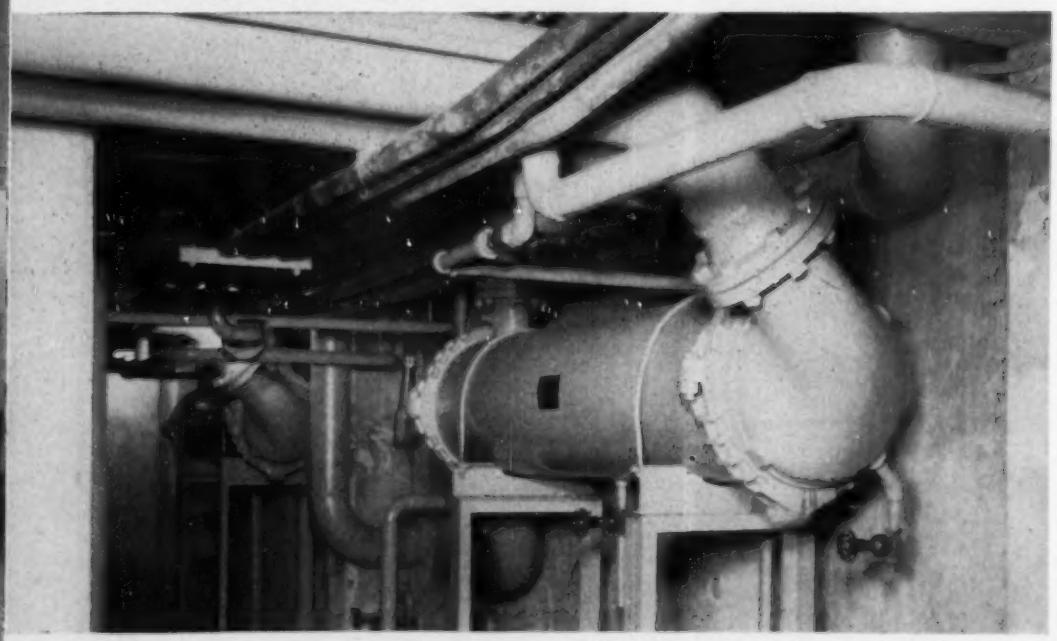
diesels have joined the others in the system in helping to carry peak loads.

This is important and valuable service but not the kind that means large totals in kilowatt-hours generated or engine-hours operated. Yet, even here the contribution is considerable. The two Alco diesels at Dodge Center have run as much as 1,062 hours in a single year and, in four years of intermittent operation, have generated more than 2,000,000 kwh. The plant is unattended except when the engines are running and then either the district-representative or a lineman acts as operator. The engines in this plant are identical four-cycle, turbo-charged Alco diesels, each with eight cylinders, 12½-in. bore and 13-in. stroke, developing rated 1300 hp. at 720 rpm. Each engine drives an 1150 kva., 920 kw., 3 phase, 60 cycle, 2400/4160 volt Electric Machinery generator with direct-connected 10 kw., 125 volt exciter. These engines are arranged for air starting and experience has shown that the diesels can be started and put on the line in a very short time in case of need.

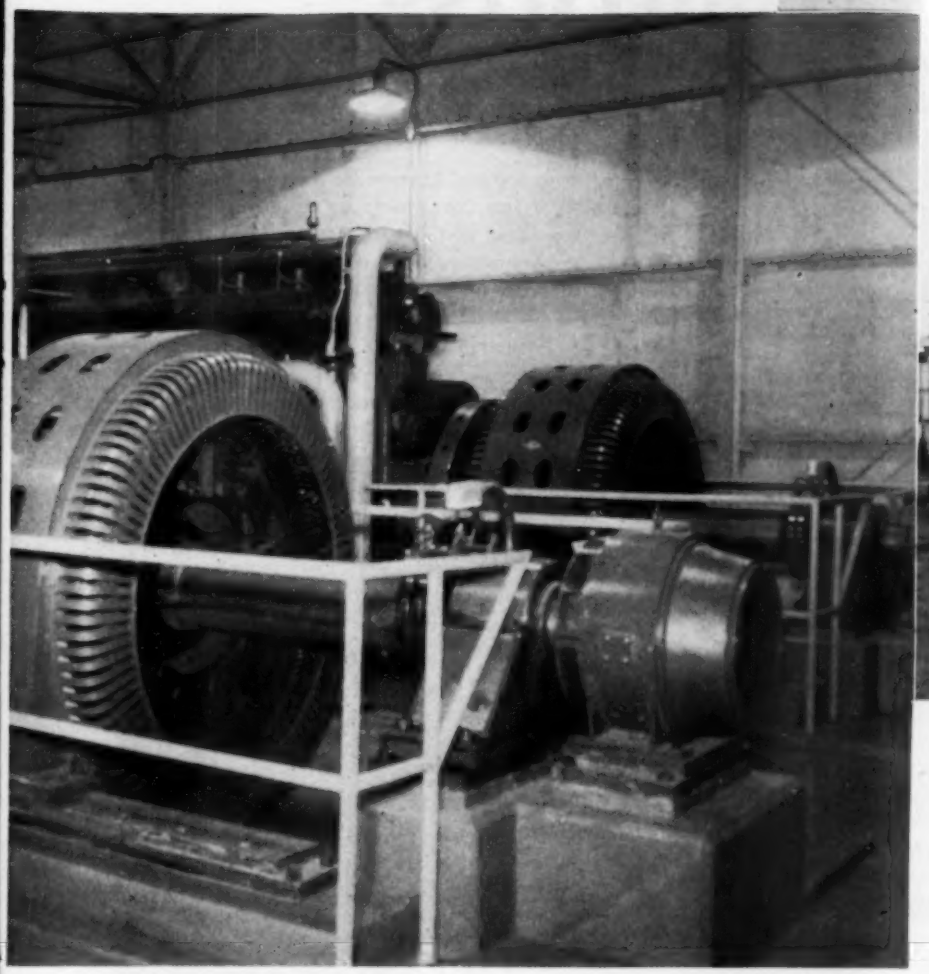
The cooling system for the diesels was designed to provide simplicity of operation for relatively inexperienced personnel and to eliminate the danger of freezing the coolant during winter periods when the plant was idle and unattended. A simple closed cooling system was devised with the engine driven



Lube oil for both the Alco and GM diesels is cleaned by Hilco purifiers with cellulose filtration elements.



All 27 diesels, whether Alco or Cleveland diesels, are served by Alco oil coolers.



Air for both the Alco and GM diesels is drawn through Continental Whirlwind oil bath filters.

centrifugal water pumps circulating the coolant through a pair of air-cooled heat exchangers outside the building. The air-cooled exchangers (which are used for all 27 diesels in the system) are Alco Type W-4-12 and are equipped with fans driven by 25-hp. electric motors. Engine jacket temperature is controlled by an automatic thermostatic bypass valve.

The coolant used during the winter months contains 50 percent ethylene glycol anti-freeze solution which solves the problem of damage by freezing. Care is taken to guard against corrosion which might be caused by increasing acidity of the coolant. Samples are taken regularly for laboratory analysis and polished steel specimens are immersed in the engine cooling systems and are removed periodically for inspection. Thus far, no serious corrosion has been observed. To preserve this expensive anti-freeze solution as long as possible, it is drained from the system for the summer months and stored in a 2,500 gal. tank in the plant basement. This has the advantage of permitting sludge to settle to the bottom of the tank and the bottom six inches of solution is not returned to the engines. During the summer, soft water treated with sodium chromate is used in the cooling system.

Lubricating oil is circulated through each diesel under pressure by an engine-driven pump and is cleaned continuously by a built-in full-flow filter as well as a bypass purifier with cellulose filtration elements. The lube system includes an oil cooler (in which the lube is cooled by coolant returning from the big air-cooled exchangers to the engines) and a motor-driven auxiliary lube pump. In four years, the two diesels at Dodge Center have averaged 5,589 hp. hrs. per gal. of lube consumed.

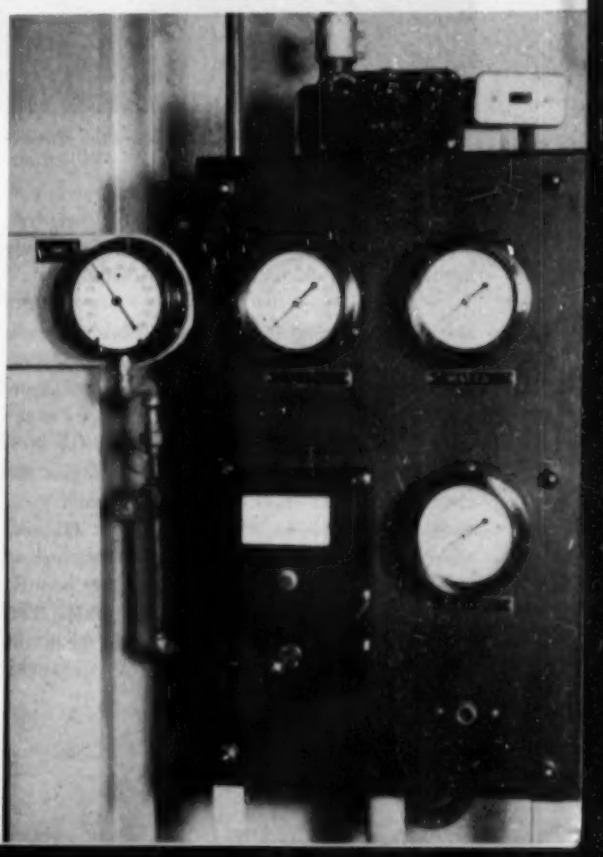
The No. 2 diesel fuel used in this plant is unloaded from trucks into two 9,742 gal. storage tanks. These tanks are equipped with heaters and are arranged so that engine coolant can be circulated through coils to warm the oil. A motor-driven pump transfers fuel to elevated day tanks from which the oil flows to the engine booster pumps, then through filters to the individual injection pumps. Intake air is drawn through oil-bath filters and supplied to the cylinders by the exhaust-driven turbochargers. Exhaust gases vent through vertical silencers. Each engine is served by a gauge board which holds pressure gauges, a multi-point exhaust pyrometer and an alarm panel.

After nearly five years of experience, Northern States officials feel their decision to build ten diesel stations has been fully vindicated. It is their judgment that the diesels have performed all intended functions, benefiting the company and its customers.

Principal Equipment in the Dodge Center, Minn Plant

Engines—Two 1,300 hp., 8 cyl., 12½ x 13 in., 4-cycle supercharged diesels operating at 720 rpm. American Locomotive Co.
Generators—Electric Machinery.
Governors—Woodward.
Fuel transfer pumps—Viking.
Fuel supply pumps—Tuthill.
Fuel injection pumps—American Bosch.
Lube oil pumps—Geo. Roper.
Lube filters—Cuno.
Auxiliary lube pumps—Viking.
Oil coolers—American Locomotive.
Lube oil purifier—Hilliard.
Thermostatic controls—Fisher.
Air compressor—Gardner-Denver.
Switchboard—ITE.
Instruments—General Electric.
Alarm panel—Viking.
Pyrometer—Alnor.
Air filters—Continental Whirlwind.
Silencers—Maxim.

For each engine there is a gauge panel with Viking alarms, Alnor exhaust pyrometer and pressure gauges on lube, fuel and water.



THE "MARY LEE HILLMAN"

By DAVID I. DAY

THE streamlined diesel towboat *Mary Lea Hillman* of the Hillman Transportation Co., Pittsburgh, typifies in the mind of the average inland riverman the peak of Hillman construction ability and efficiency. She came off the ways at the Hillman Barge & Construction Co., Brownsville, Pa., in time to go down the old Monongahela River with her first payload, six barges of coal, on last August 5.

From her first trip this new pusher has moved up and down the river regularly with all the sureness of a veteran. In command of Capt. George Kanyock, she has brought forth an unusual volume of praise from men on competing boats and others. On many occasions she has indicated her true power, using Kort nozzles, exceeds considerably her rated power, something around 1000 hp.

Her two main engines are General Motors diesels, 6-cylinder, 2-cycle units with engine bore of 8¾" and a stroke of 10½". We can add here that the engine room of the *Mary Lea Hillman* is one of the most pleasant in appearance and one of the most efficient in performance to be seen in any of the river pools in the trade territory of Greater Pittsburgh. She represents the last word in Hillman construction experience. Now, after six months of steady towing, we can report that no more popular work boat is performing on the Monongahela. This fact is a tribute to the builders of the boat, the manufacturers of her many items of equipment, and to the men who work on the craft, in particular the pilots and the engineers.

We saw the boat last summer loading coal at Floreffe some 25 miles from Pittsburgh and all set to start down river, we were told, for the Bruno Island big power plant located on the Ohio River just a few miles from Pittsburgh's Golden Triangle. No river boat of her size will push a bigger coal tow with greater ease than was demonstrated on this occasion. The *Mary Lea's* dimensions are approximately 118 x 27 x 8.6 feet. Her pilot house is reasonably roomy and is properly ventilated. It offers a wide range of vision which is exceedingly useful on this busy and narrow river. All the modern pilot house controls are in use. The boat is driven by two 72" propellers from the American Manganese Bronze Corporation. There is a Falk airflex clutch in use.

Referred to recently in a river newspaper as "the coal pusher deluxe" it is easy to give credence to the prediction that the *Mary Lea* will offer her owners not merely a long but an exceptionally satisfactory period of service. Nothing has been spared to give the craft unusual sturdiness and durability, and with these things, the boat's interior impresses every visitor with its hominess and comfort. The galley and lounge room are large and well-appointed. The officers and men aboard have mentioned many times the boat's many features designed for their use and pleasure. "A livable boat," said one recently, "if ever one was found in this part of the world." There are ample quarters for 12 men or more and fuel storage space for some 20,000 gallons.

In Pittsburgh recently it was called to our attention that the greatest river boats of today first existed in the mind of the planner. He first visualized the work the boat should do. The completed vessel would reflect that mental picture. This boat was built for coal towing on the Monongahela and the extreme upper Ohio Rivers and she is doing a

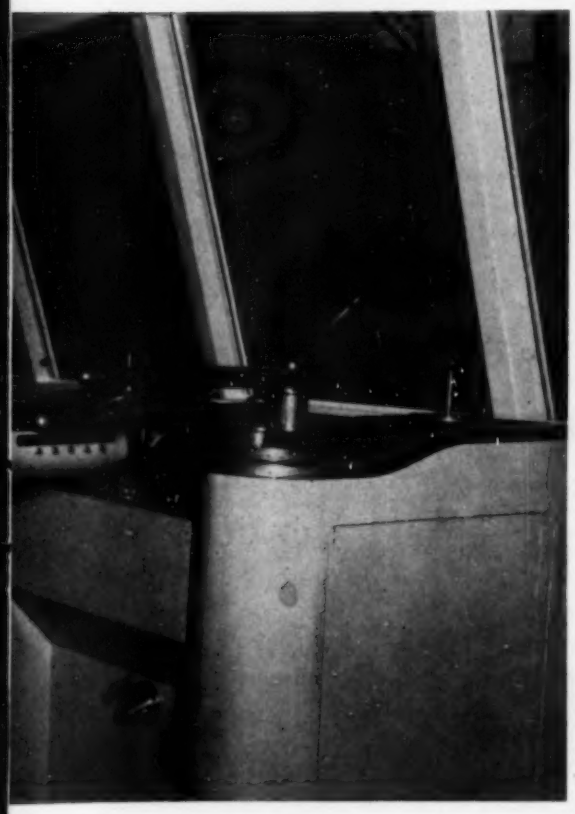
The *Mary Lee Hillman*. Note the sleek, smooth lines.

remarkable job of it. Every construction angle, every movement of the vessel reminds the observer of this fact. She could well be designated as the spirit of the Pennsylvania coalfield. The *Mary Lea Hillman* is the culmination of a long record of successful diesel vessel construction at Brownsville. From this port came such outstanding towing craft as the *Solvay*, the *LaBelle*, the *Robert W. Lea*, (one of the three most noted of the recent coal towboats on the Ohio), the *Henry L. Hillman*, the *Cap'n Howder*, the *Patsy Hillman*. Also a product of the yards is the favorite of the American Barge Line fleet, the motor vessel *Trade Winds*. She is often called the boat with the most appealing name on the inland waterways.

The Hillman company is headed by a popular business leader, Frank P. Silliman, who has encouraged a constant study of how to put more and more power into smaller and smaller hulls. It is no betrayal of a secret to state that many rivermen of long experience see in the *Mary Lea Hillman* a nearly perfect example of that theory in practice. Even strangers to the coal country are invariably impressed with the size of the coal tows moved by a vessel only 118 feet long. The boat has six balanced all-welded rudders with forged two-piece stocks. The top bearing is a Timken radial thrust, the lower one a Goodrich Cutless on Kort nozzle pintle, and the center, bronze sleeve. The shaft bearings are water lubricated from the main engine pumps and are Goodrich cutless rubber on an American Forge shaft.

The steering gear system has brought considerable praise to the towboat this winter. It is a Racine hydro-electric system with Westinghouse motors and Clark controls. The cylinders are 6-inch Lindbergs. The open center steering valves were the work of the boat building company. There is a

The pilot house interior of the *Mary Lee Hillman*.



A view of the engine room of the *Mary Lee Hillman*. One of her main General Motors main propulsion diesels is at the left.

Pelham Electric switchboard with two Sheppard 6-cylinder generators, with closed water cooling. The boat's pumps are the Roth fire and bilge pump, two Aurora house pumps, and an Ingersoll-Rand filter feed pump. For the wash water there is a Hygeia filter and a Wilson chlorinator. The water heaters are A. C. Smith electrics.

The Hillman shipyards have won an enviable reputation for the efficient heating systems installed on their boats. This is very important in the Pennsylvania winter climate. On the *Mary Lea*, the builders used the hot water Way-Wolff heater with a Ray automatic oil burner. So far as on other Hillman-built towboats, the cozy interior defies the wildest winter gales striking the *Mary Lea*. Fedders convectors and Modine unit heaters give smooth radiation. The controls and booster pump are from Bell & Gossett. Exceptional satisfaction is being given by the Hose & McCann intercommunicating telephone system direct from pilot house to the engine room, with a Teletalk to the deck and on the barges. A Radiomarine radiotelephone was installed for ship-to-shore messages. The Clark Cooper airhorn is a most satisfactory installation as is the neat Herschel panel. The floodlights are from Crouse-Hinds, the searchlights from Carlisle & Finch, and the running lights from Perkins. On the towboat's deck are a pair of American Hoist & Derrick 5-ton handwinches, two Schoellhorn-Albrecht 10-hp. capstans with Westinghouse power and Clark controls. World Steel Company furnished the steel doors and the steel bulkheading. Johns-Manville insulation was used with Adams Westlake aluminum cabin windows and neat pilot house windows from the Kearfott Engineering Company. With a neat and sanitary galley, completely equipped in good hands, the problem of feeding is nonexistent on the boat. There is a fine modern South Bend range, Jamestown cabinets were installed, and the fixtures are from American Radiator. There is an ample-size General Electric refrigerator and a Servel night-box. A pilot on the Monongahela in a casual conversation in Pittsburgh pointed out the nice galleys were a trade-mark of all Hillman boats. He thought the *Mary Lea's* kitchen one of the most complete on the rivers.

Although the boat is often called a special boat for a special job, the truth is she may serve in other trades on many rivers before she is dismantled. She has two essentials of major tow-boating anywhere, namely power and range. She has unquestioned pushing prowess, is easily steered, is always ready for maximum thrust in the pinch, and is operated economically. All of these features would help win fame for her in oil towing or coal towing, for instance, on the upper Mississippi or the Illinois. The performance of the main engines and the big 6-ft. propellers has been noticably satisfactory on this boat and they are in combination what may make or break the success of a towboat under modern highly competitive conditions. The manufacturers of the Ross heat exchangers used in water cooling and lube oil cooling and the makers of the Briggs clarifier in use rate their share of credit for the performance of this towboat. As we check our notes, we find praise accorded every piece of equipment on the *Mary Lea Hillman*, including the radiators, the Philip Carey pipe insulation, and numerous other items. No part of the equipment is present without contributing to one of the best-liked boats on any river today.

Life was moving briskly in this highly industralized region last autumn. The coal strike was settled. Business was good everywhere. We proceeded from Belle Vernon into Pittsburgh on the banks of the old "Monon" of song and story. Mostly from State Road 837 we witnessed the performance of many excellent diesel vessels—the *B. F. Fairless*, the *Wm. Pitt*, the *Freedom*, the *Buckeye*, the *Victory*, and many more, moving up and down river, by night and by day. But from the McKeesport Bridge we saw the most inspiring sight and the neatest snapshot of the trip. It was the *Mary Lea Hillman* with Capt. Jesse Churllie, we imagine, in the pilot house.

SUPERCHARGED TWO CYCLE GAS ENGINE COMPRESSOR

Clark Cracks The Gas Transmission Market Wide Open With A Supercharged Right Angle Gas Engine Compressor

THE New Clark Model TRA is America's first turbocharged 2-cycle right angle gas-engine-driven compressor unit. It marks another forward step in meeting the ever-growing demand for more compact, more powerful compressors. It sets new standards both for fuel economy and for station auxiliary requirements. The Clark Model TRA-8, which develops 1320 brake horsepower, has eight vertical, in-line cylinders of 14 in. bore and 14 in. stroke, integrally connected to horizontal compressor cylinders.

The TRA represents a unitized, integrated design. Turbocharger and compressor have been specifically designed and built by Clark to operate as a perfectly matched, balanced unit. In addition to the TRA8, other Clark "Angle" compressors are now available as turbocharged units with comparable increases in power and operating economies.

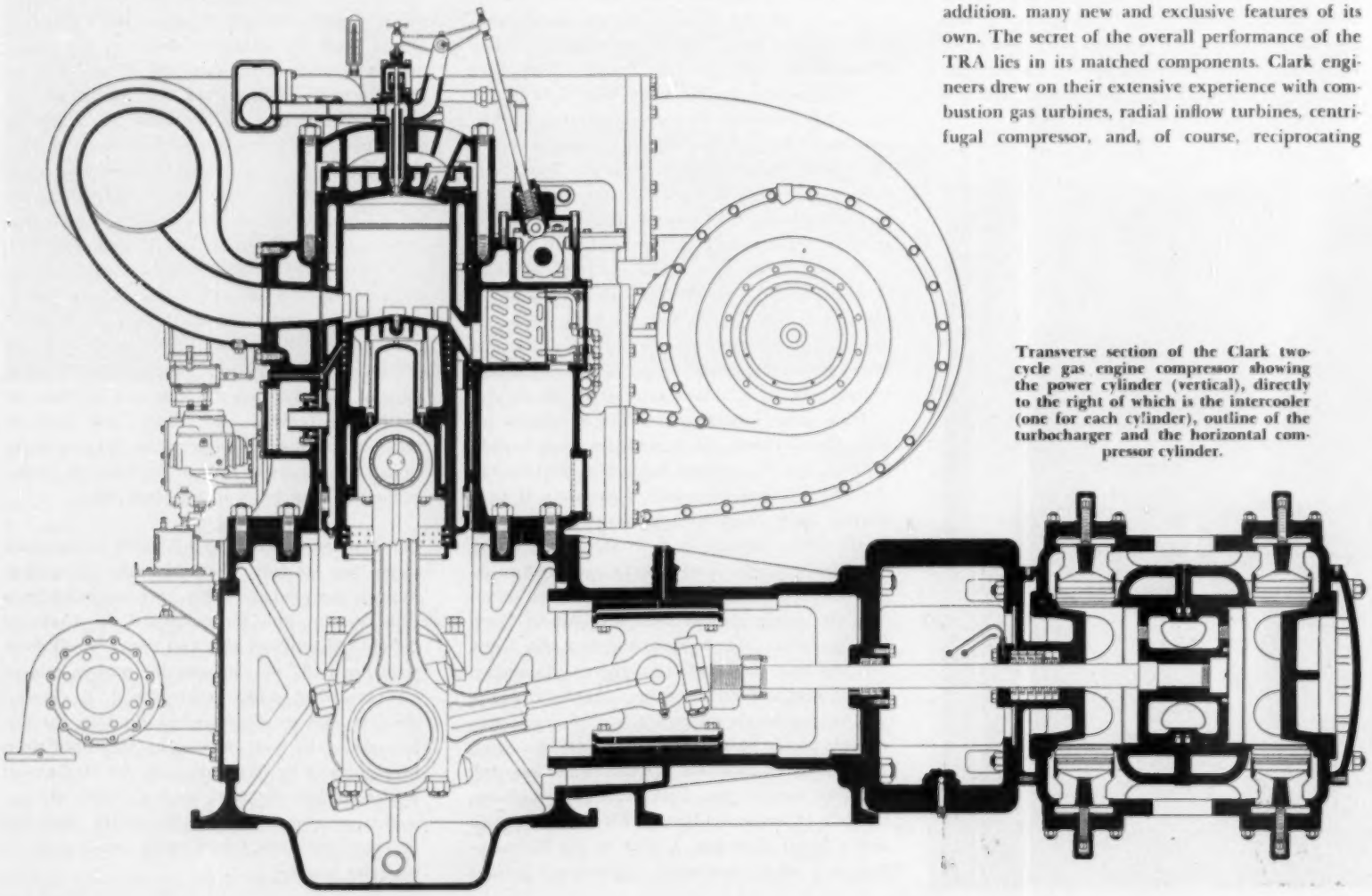
These are some of the outstanding features claimed for the Clark TRA: Fifty per cent more power than any non-turbocharged unit now built of comparable bore and stroke. There is no encroachment on overload carrying ability. New Lows in Fuel Consumption—Conservatively rated and guaranteed to burn substantially less fuel than any gas-engine-driven compressor now built.

Twenty-five per cent less water cooling load—The TRA requires 25% less cooling water per bhp. than the best non-turbocharged, high compression, gas-engine-driven compressor now built, even including scavenging air intercooling. Flat Fuel Consumption Curve—Fuel consumption remains practically constant between 70% of load and maximum load.

Quieter Operation—Noise is converted into energy in the TRA. It is the quietest and smoothest operating gas-engine-driven compressor ever built. No exhaust pulsations. Compact, yet accessible, 2-cycle In-line design—All Clark turbocharged units incorporate all the time-proved advantages of the famous Clark "Angle" design—simple, compact, accessible.

The turbocharger of the Clark TRA was designed and built to match specifically the characteristics of its companion gas-engine-driven compressor. It operates at conservative speeds and temperatures for extremely long life and dependability. Simple stated, turbocharging as incorporated in the Clark TRA is a method of converting waste heat into energy. This is done by using the waste heat, velocity and mass flow of the exhaust gases to drive a radial inflow turbine. The turbine, in turn, is integrally connected to a centrifugal compressor. This centrifugal compressor pumps air for scavenging the power cylinders and also provides air for combustion. Thus, in the TRA no scavenging cylinders are required. The Clark Turbocharger is positively driven by the engine at start-up and on light loads. Under all other load conditions, it operates independently of the engine, its speed automatically conforming to the load placed on the engine.

While it incorporates many of the time and field proved principles of Clark gas turbines and centrifugal compressors, the Clark Turbocharger has, in addition, many new and exclusive features of its own. The secret of the overall performance of the TRA lies in its matched components. Clark engineers drew on their extensive experience with combustion gas turbines, radial inflow turbines, centrifugal compressor, and, of course, reciprocating



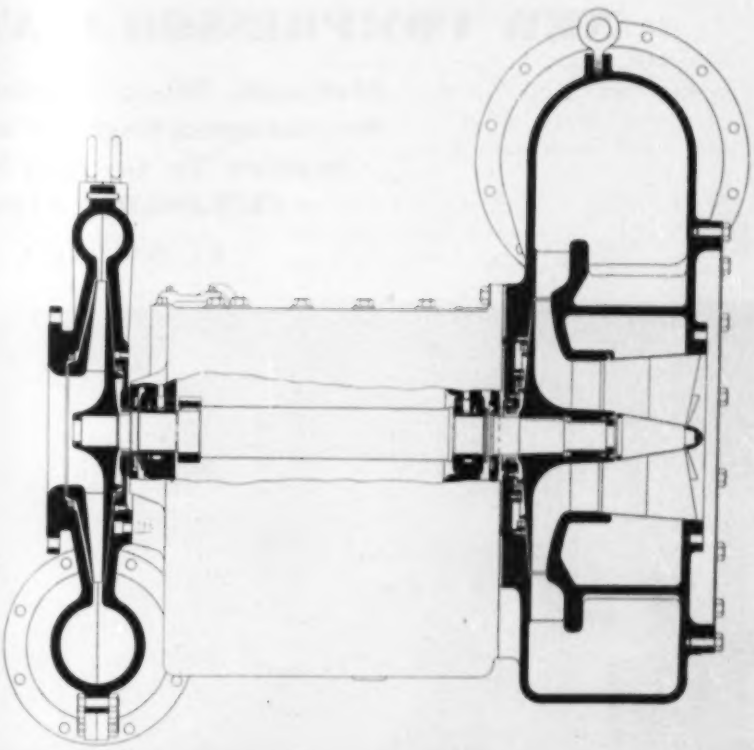
Transverse section of the Clark two-cycle gas engine compressor showing the power cylinder (vertical), directly to the right of which is the intercooler (one for each cylinder), outline of the turbocharger and the horizontal compressor cylinder.

compressors to design a perfectly matched engine and turbocharger. Significantly, this was accomplished without sacrifice of any of the flexibility for which all Clark compressors are famous.

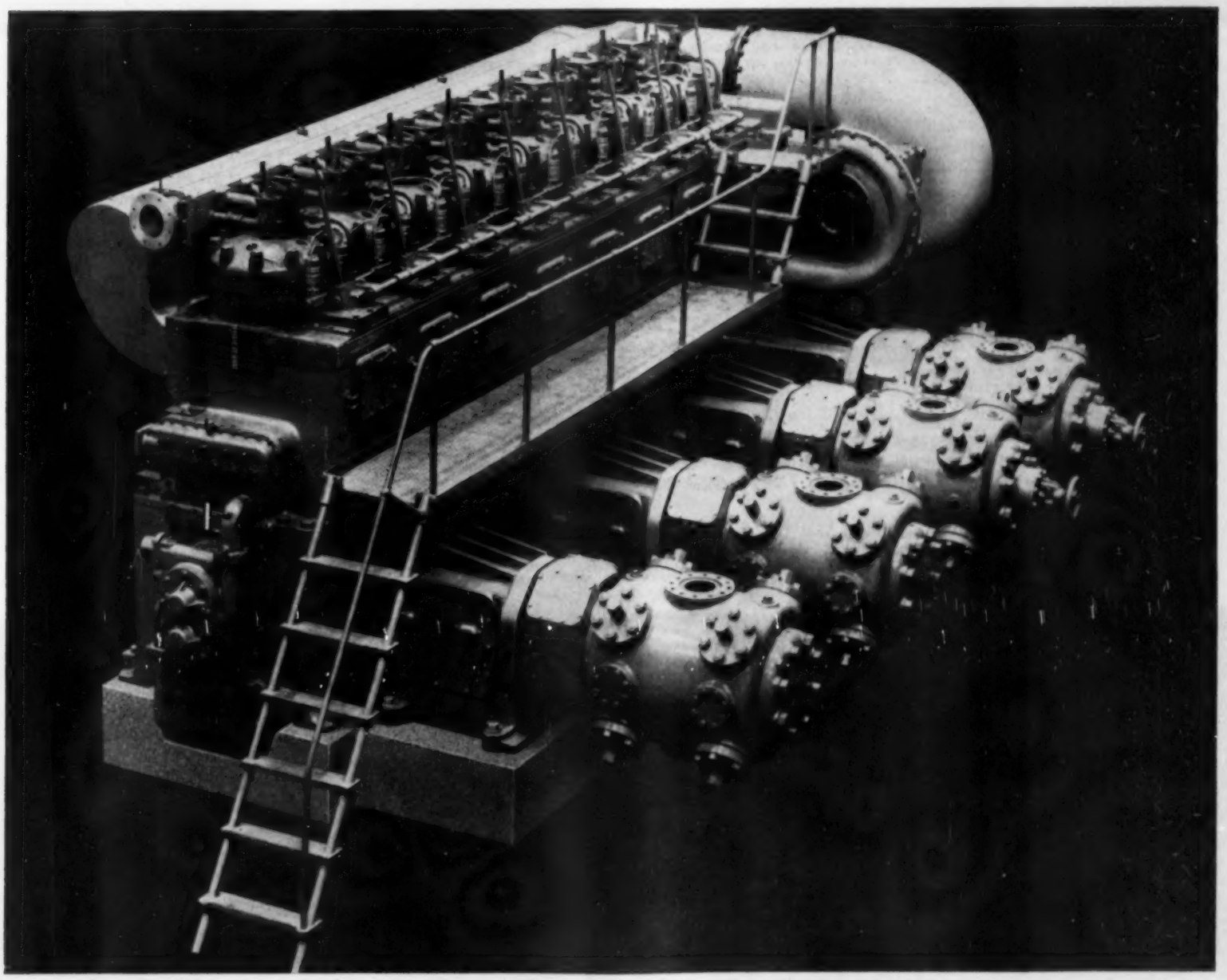
For its size and horsepower, the Clark TRA is a rugged compressor. This ruggedness reflects the Clark policy of conservative bmep. ratings for maximum durability. To absorb the increased power output of the turbocharged TRA, it was necessary to design a completely new unit— new in that no other design has ever approached its massive construction—yet time-tested in that only field-proved features made famous by other Clark "Angles" have been incorporated in its design.

Following the established Clark practice, the TRA features 2-cycle in-line design. In addition to its excellent balance, the Clark TRA also features cylinder block construction with removable power cylinder liners, precision bearings, one piece forged steel crankshafts, oil cooled power pistons, long, forged steel connecting rods, a built-in water pump and many other features that promote long, trouble-free life.

Cross-section of the Clark turbocharger for two-cycle gas engine angle compressor. Right end is the turbine, left end is the centrifugal compressor.



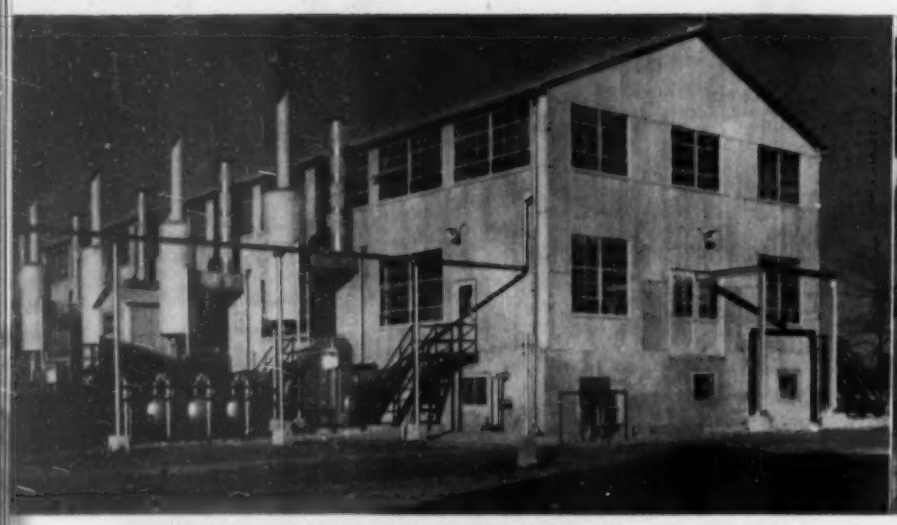
The Clark two-cycle gas engine compressor.



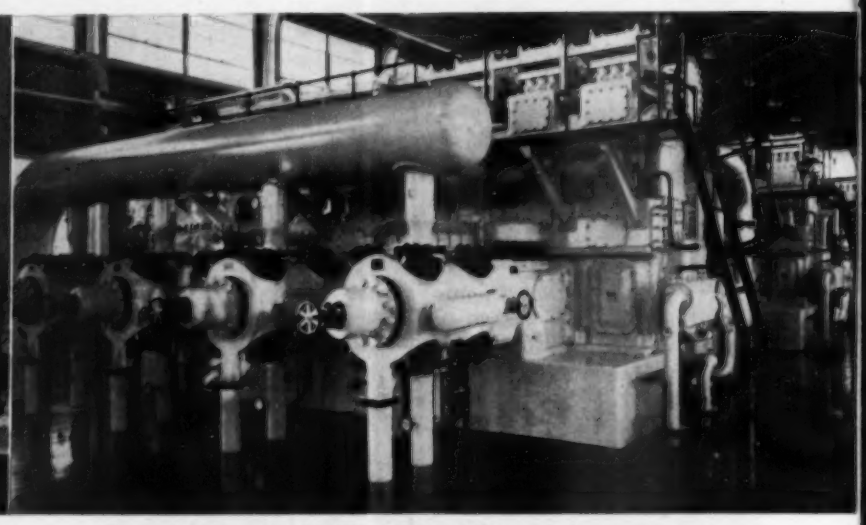
NEW COMPRESSOR STATIONS FOR UNITED GAS

McComb, Miss., Station With Five 1600 Hp. Worthington Engine-Compressors Is First New Station To Go Into Service in Vast New $250,000,000 Expansion Program

By DWIGHT P. ROBISON



The compressor station at McComb, Mississippi. View shows Maxim silencers, Continental self-cleaning air filters and starting air bottles.



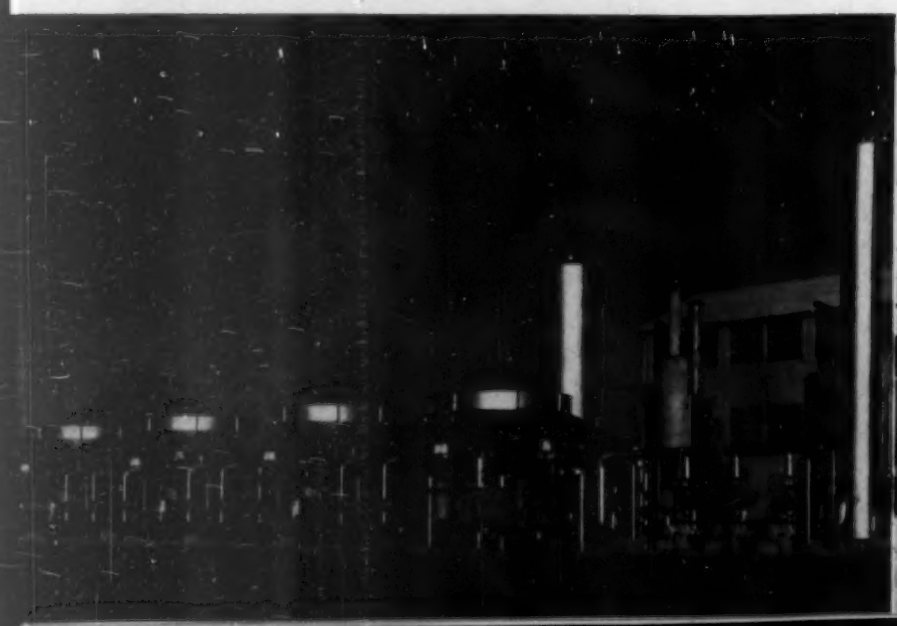
The station has 5 model UTC-168 Worthington engine compressors each rated at 1600 hp. at 320 rpm. The 8 vertical power cylinders drive 4 horizontal compressor cylinders.

FIRST new compressor station to go into service in United Gas' three-year $250,000,000 expansion program is the McComb, Mississippi, plant where five 1600-hp. Worthington natural gas engine-compressors are in operation, handling 390,000,000 cubic ft. of gas per day. The total program, scheduled for completion in 1953, includes eight compressor stations and 1,735 miles of new pipe line. End result will be to make the system capable of delivering more than four billion cubic ft. of gas per day, improved flexibility of operation and development of new natural gas reserves.

The McComb station is one of the key installations on a new 30-inch line that carries gas from Louisiana fields and from underwater wells out in the Gulf of Mexico north to Jackson and Kosciusko, Mississippi. McComb also is the terminus of a 24-inch line from the Baxterville field 41 miles to the southeast and can either take gas from this field for delivery northward or can reverse the flow and pump gas through the Baxterville line to towns in Mississippi to Mobile, Alabama, and Pensacola, Florida. Three new stations move gas into or along the 30-inch line. At Lafayette, La., four 1,100 hp. Clark engine-compressors push gas from the Iowa-Franklin line eastward to Bayou Sale Junction where it joins gas from offshore fields and other Southern Louisiana wells. About 84 miles north on the 30-inch line is the Montpelier station with major equipment much the same as that at McComb. This station has five 1,600 hp. Worthington natural gas engine-compressors and is designed to take a total of 475,000,000 cu. ft. of gas daily at 720 psig. and discharge it at 874 psig. toward McComb, approximately 54 miles to the north. The 30-inch line delivers gas to McComb at 727 psig. and the compressors discharge it at 902 psig. toward Jackson 68 miles north and then on for another 58 miles to Kosciusko. Gas in the 24-inch line comes from Baxterville under natural well pressure which varies somewhat but averages 727 psig. at the McComb inlet.

The compressor stations were designated by United Gas engineers to meet three basic requisites: efficiency, reliability and safety. This has been achieved through use of heavy-duty prime movers, ample protective accessory equipment, and elaborate, fully automatic safety devices. Gas reaches the McComb station in parallel 30- and 24-inch lines and is

Hudson Engineering Co. built the four dry air coolers handling the cooling water for all engines. Three Ingersoll-Rand motor driven centrifugal pumps circulate water to cool lube oil. The Hartzell fans are thermostatically controlled.



This view of one Worthington gas engine compressor shows the Pittsburgh Equitable lube make-up meter, the McCord cylinder lubricators, the gauge board with U. S. pressure gauges, Reliance tachometer and Alnor exhaust pyrometer, Woodward governor and American Bosch magnetos.

measured with orifice meters. The meter house contains a dual system for the Baxterville line so that flow can be measured in either direction. Next comes a scrubber installation with four units arranged in parallel. Ths big gas lines are arranged so that all five compressor units can take gas from the 30-inch suction line and discharge to the 30-inch line going north. Compressor units Nos. 1, 3 and 5 also are equipped for sending gas in either direction on the 24-inch Baxterville line. Fuel for the engine-compressors is bled from either the 30- or the 24-inch suction lines. The 3-inch fuel lines pass gas through regulators which reduce gas pressure from line pressure to 200 psig., then through meters and another set of regulators which cuts the pressure down to 30 psig. at which pressure it is fed to the engine.

The five engine-compressors are identical Model UTC-168 Worthingtons, each rated at 1,600 brake horsepower at 320 rpm. Each of these two-cycle natural gas engines has eight vertical power cylinders of 16-in. bore and 16-in. stroke driving off the same crankshaft four horizontal compressor cylinders of 11-in. bore and 16-in. stroke. Fuel gas in the eight power cylinders is ignited by four magnetos. Each magneto serves four cylinders, thus providing double ignition for each cylinder. The equipment and attention devoted to lubricating oil purification exemplifies the meticulous care in plant design and operation to insure that the engines perform flawlessly with a minimum of down time for maintenance. A good quality oil is purchased in transport truck lots of 3,500 gal. and stored in a 12,000 gal. tank. As makeup is required, a motor-driven pump is employed to transfer lube oil from storage to engine crankcase or to the cylinder lubricators. A meter at each engine measures the oil added to either system.

The pressure lube circuit of each engine includes a full flow mechanical filter, a full flow 18 cell cartridge-type filter and an 8 cell partial flow cartridge-type fullers earth filter. In addition, lube oil can be drained from an engine crankcase or blown by compressed air from the filters to a dirty-oil tank in the adjoining auxiliary building. This oil can be put through an 8-cartridge purifier with fuller's earth filtration material. Company engineers plan to raise operating temperature of the jacket water from 160° F. to 180° F. thus raising the emperature of the lube oil in order to improve efficiency by reducing condensation in the crankcase of the engine. Jacket water for the engines and cooling water for the engine oil is cooled in four dry air coolers outside the compressor building. Three motor-driven centrifugal pumps circulate the cooling water to cool the engine oil. A belt driven centrifugal pump on each engine connected to the engine shaft circulates the cooling water through the engine jackets and the dry air coolers. Each dry air cooler has a separate section for the lube oil cooling water and the engine jacket water. Water temperature in the engine jackets is maintained by automatic thermostatic controls which bypass water around the coolers and control the radiator fans. Scavenging air for the engines is drawn through automatic self-cleaning filters and supplied to the cylinders by a pair of scavenging air pumps driven off each crankshaft. On each engine is a panel with pressure gauges for water, lube oil and fuel gas pressures, a tachometer and a multi-point exhaust pyrometer.

In any gas compressor station, the safety of personnel and equipment rates careful consideration and at McComb elaborate precautions have been taken. The engines are shut down automatically if lube or fuel gas pressure fails or if water temperature rises above prescribed limits. When necessary, it is possible to bypass gas around the station. The big valves on the suction, discharge and bypass lines are hydraulically motor operated and the valves can be set to bypass the station simply by electric pushbutton control. At the same time, this would ground the magnetos, shutting down the engines. This is by no means the full extent of the safety precautions. The station is equipped with automatic control devices actuated by pressure differential in the gas lines. If these is a sudden increase in pressure differential such as would be occasioned by a break in gas line, the safety control automatically actuates a mercury switch which causes the suction and discharge valves to close and shuts down the engines by grounding the magnetos. Thus, in the event of a line rupture, operators need think only of their own safety, knowing that the station will be shut down automatically.

The operation of the solenoids is dependent, of course, on availability of electricity. Normally, the station is supplied with purchased power from a utility company line, but in the auxiliary building is a Model CCG-5 Worthington natural gas engine rated at 445 hp. at 514 rpm., driving directly a 300 kw. Electric Machinery synchronous generator. This unit makes the station self-sufficient, supplying the safety system solenoids and other emergency requirements if the station power supply fails.

The McComb station started regular service on April 3, 1952 and has been in continuous operation since May. The other two stations in this section of the system followed into service last Summer, the Lafayette station on July 22nd and the Montpelier station on August 1. To handle about 390,000,000 cu. ft. a day, McComb has averaged about 2,250 unit hours a month which means three engines at full load 24 hours a day. In practice, of course, this means occasional operation of four engines. The operators run an engine for a week or ten days, then switch to another unit so that each engine gets an equal share of the work. It is anticipated that the station load will be increased about 25 percent this Spring with delivery of an additional 95,000,000 cu. ft. per day. This will bring all five engine-compressors into service.

Sound design and operation are paying off. The new station has been remarkably free of "bugs" and there has not been a single enforced shutdown because of engine failure. By the time this is published, all eight new compressor stations should be in full service, adding 64,000 hp. to the big gas system, and United Gas will be entering the final phase of the huge 3-year expansion program. This development work in the "Gulf South" served by United Gas will make the company the first in the world capable of handling a trillion cu. ft. of gas per year.

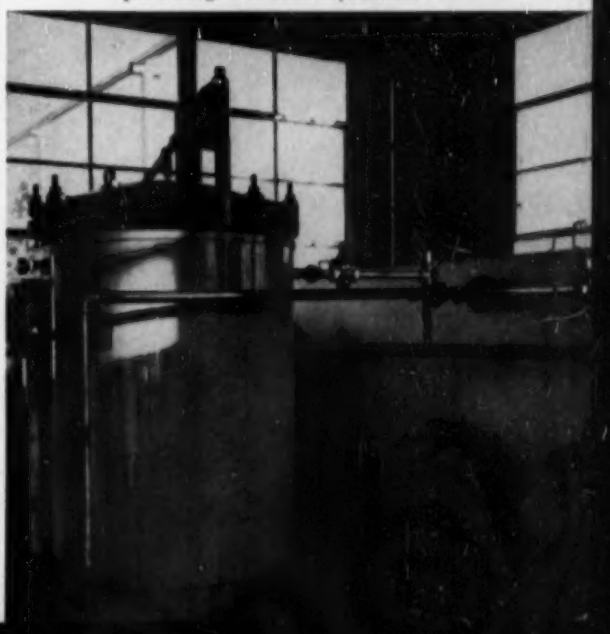
List of Equipment

Compressors—Five 1600-hp., Model UTC-168 engine compressors operated at 320 rpm. having 8 vertical power cylinders (16x16) driving 4 horizontal compressor cylinders (11x16-in.) Worthington Corp.
Magnetos—American Bosch.
Regulators—Fisher Governor Co.
Orifice meter—Commercial Iron Works.

The station's electrical requirements are met by this model CCG-5 Worthington gas engine. It develops 445 hp. at 514 rpm. Note Electric Machinery generator, belted Worthington water pump and Cuno lube filter.

Lube oil—Shell.
Lube filters—Hilco.
Air filters—Continental.
Exhaust silencers—Maxim.
Air compressors—Ingersoll-Rand.
Auxiliary engine—445-hp., Model CCG engine operating at 514 rpm. Worthington.
Generator—Electric Machinery.
Filter on auxiliary engine—Hilco.
Gauges—Jas. P. Marsh Corp.
Pyrometers—Illinois Testing Lab.
Switchgear—Nelson Electric.
Instruments—Westinghouse.
Tachometers—Reliance.
Lube filter—Cuno Engineering.
Lubricators—McCord.
Meters on lube—Pittsburgh Equitable Meter.
Oil coolers—Sims Co., Inc.

When necessary, engine lubricating oil is transferred to a tank in the auxiliary building and put through this Hilco Hyflo filter.

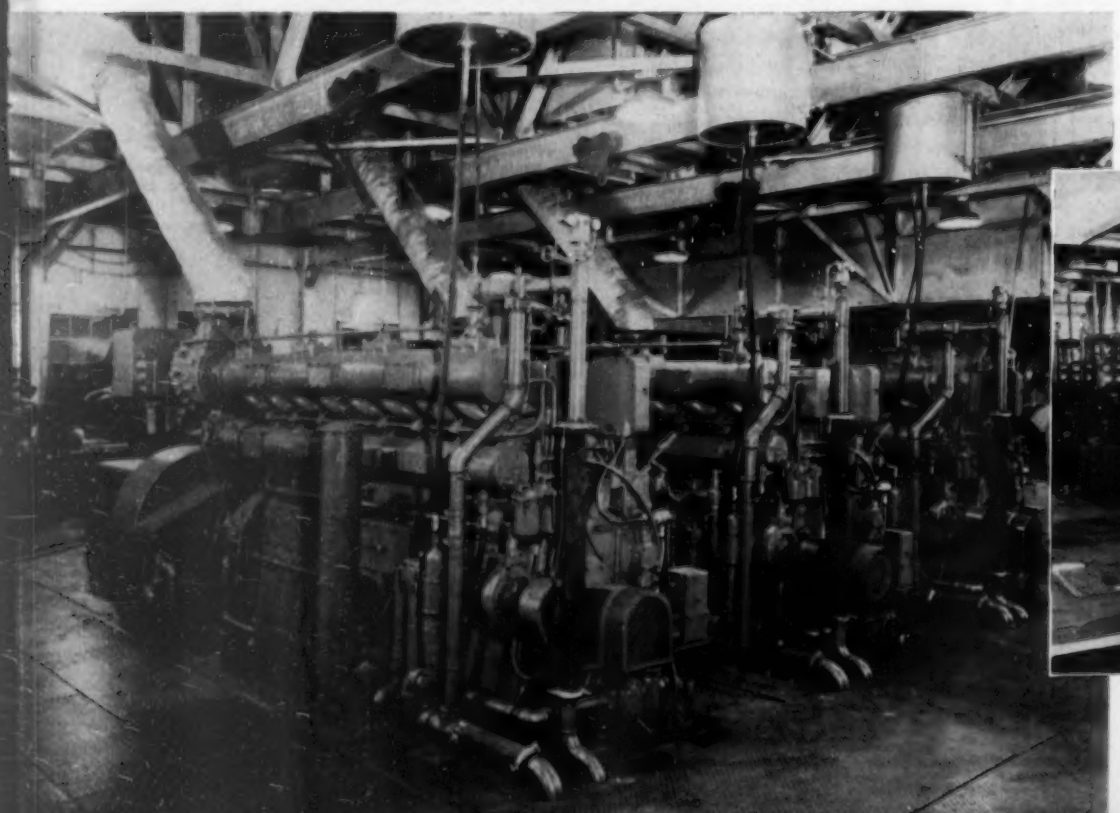


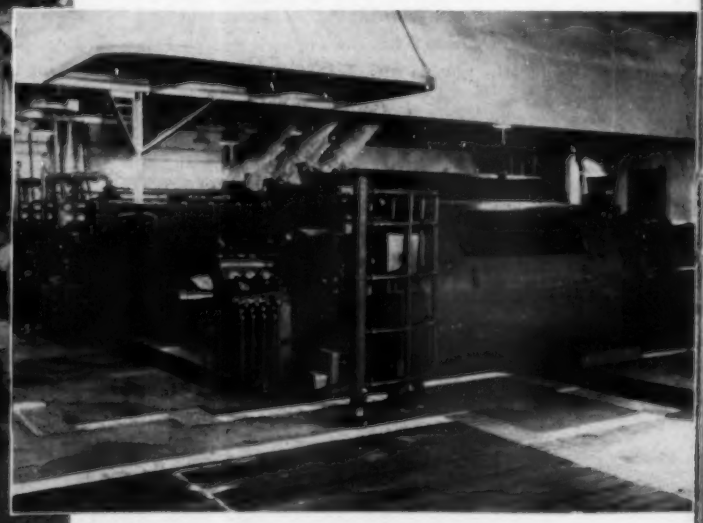
DRILLING BARGE "W. M. KECK, SR."

THE world's biggest drilling barge, a floating structure four stories high with equipment designed for drilling to 20,000 feet, is now on location in Louisiana waters. Known as the *W. M. Keck, Sr.*, the barge was built for The Superior Oil Co. by Levingston Shipbuilding Co., Orange, Texas. Drilling equipment was supplied by The National Supply Co. The huge drilling rig on the barge is the identical Ideal Type 160 with which Superior drilled the world's deepest hole, nearly four miles straight down, in 1949, plus additional auxiliary or stand-by equipment and added engines for greater power. Its power plant totals more than 5,000 horsepower. Its derrick rises 192 feet above the derrick floor; its gin pole is more than 240 feet above the main deck footings.

The barge is designed primarily for one thing—to be an extremely efficient drilling rig that can be moved quickly from one location to another, for very deep drililng. The Superior Oil Co. bought the Ideal Type 160 Rig, the first of its kind, after it was exhibited at the 1948 International Petroleum Exposition at Tulsa. Consisting of a draw works and related equipment normally considered for drilling in the 16,000 to 20,000 feet depth range, it reached its record-breaking depth of 20,521 feet near Rock Springs, Wyoming. This is the greatest depth to which man has ever penetrated the earth's crust.

The submersible barge is 237 feet long, 54 feet wide, and has a hull depth of 14 feet. The barge





This 3 engine compound drive group consists of three Superior PTDS-8 diesels, each with its own Ideal-Gyrol fluid drive; provides horsepower for the Ideal Type 160 draw works. It represents only a portion of the power available on the *W. M. Keck, Sr.*

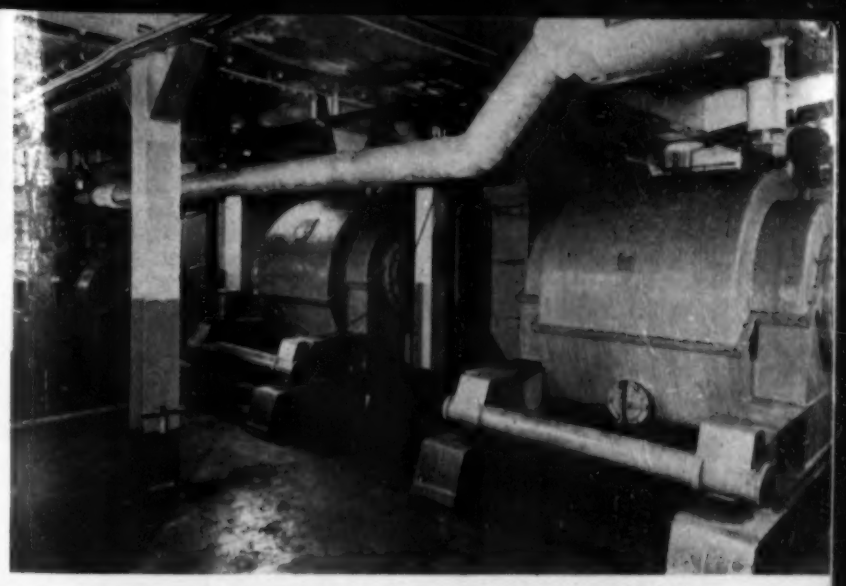
has a minimum draft of 4 feet 6 inches. It is intended for working in water up to 12 feet deep. It has a slot 108 feet long. The barge consists of four decks, including the barge hull deck, surmounted by the derrick. Because of low overhead clearances near the shipyard, the derrick was erected at the location.

The aft part of the third deck serves as the derrick floor. Here is located the Ideal Type 160 draw works, a 3-engine compound drive group with Ideal-Gyrol fluid drives, and three Superior PTDS-8 diesel engines. An unusual feature is that a modified Ideal Type 130 draw works, with large sand reel, is available for standby use. It is driven by a Superior PTD-6 diesel through a Twin-Disc 16000 Series torque converter. This second draw works also serves as a wire line anchor. It is equipped with a special lever type pressure transformer for the Martin-Decker weight indicator. The sand reel has a capacity of 25,000 feet of 9/16 inch line. A Type 205 Multimatic Rotary is used. Other derrick equipment includes an Ideal Type MUB swivel, a Type 760 crown block, a Type 660-TD traveling block, and a Type E-54 connector.

The pump group, consisting of two Ideal Type E-700 pumps and a Type C-350 pump, are located on the main deck, which is the deck of the hull. The two Ideal Type E-700 pumps are driven from a four engine drive group on the deck above. The independently driven C-350 pump, also on this deck, is driven with a Superior PTD-6 engine through a Twin-Disc 16000 Series torque converter. Two Pomona Type deep well pumps for raw water also are located on this deck. On the second deck are located the drives for the two large pumps, consisting of a 4-engine compound drive group including four Superior PTDSG-8 diesel engines. Each engine is equipped with an Ideal-Gyrol fluid drive that drives down to the pumps through 2-speed pump drives with 1½ inch sextuple chain.

Nine diesel engines provide horsepower for drilling operations. Exclusive of the ac. electric generating plants, the horsepower available on the barge includes that of the three PTDS-8 engines, serving the

Section of the main deck on the drilling barge *W. M. Keck, Sr.* showing the pump group. Main battery of pumps consists of two Ideal Type E-700 pumps driven from the Superior four-engine drive group on the deck above, and an independently driven Ideal Type C-350 pump. In the rear is the Superior PTD-6 diesel with Twin-Disc torque converter that powers the Ideal Type C-350 pump.



draw works, rated at 650 continuous horsepower each; the PTD-6 on the standby draw works, rated at 300 continuous horsepower; the PTD-6 engine serving the independently driven C-350 pump, rated at 300 continuous horsepower; and the four PTDSG-8 engines, serving the main battery of pumps, rated at 650 continuous horsepower each, a total of 5150 horsepower for continuous operation.

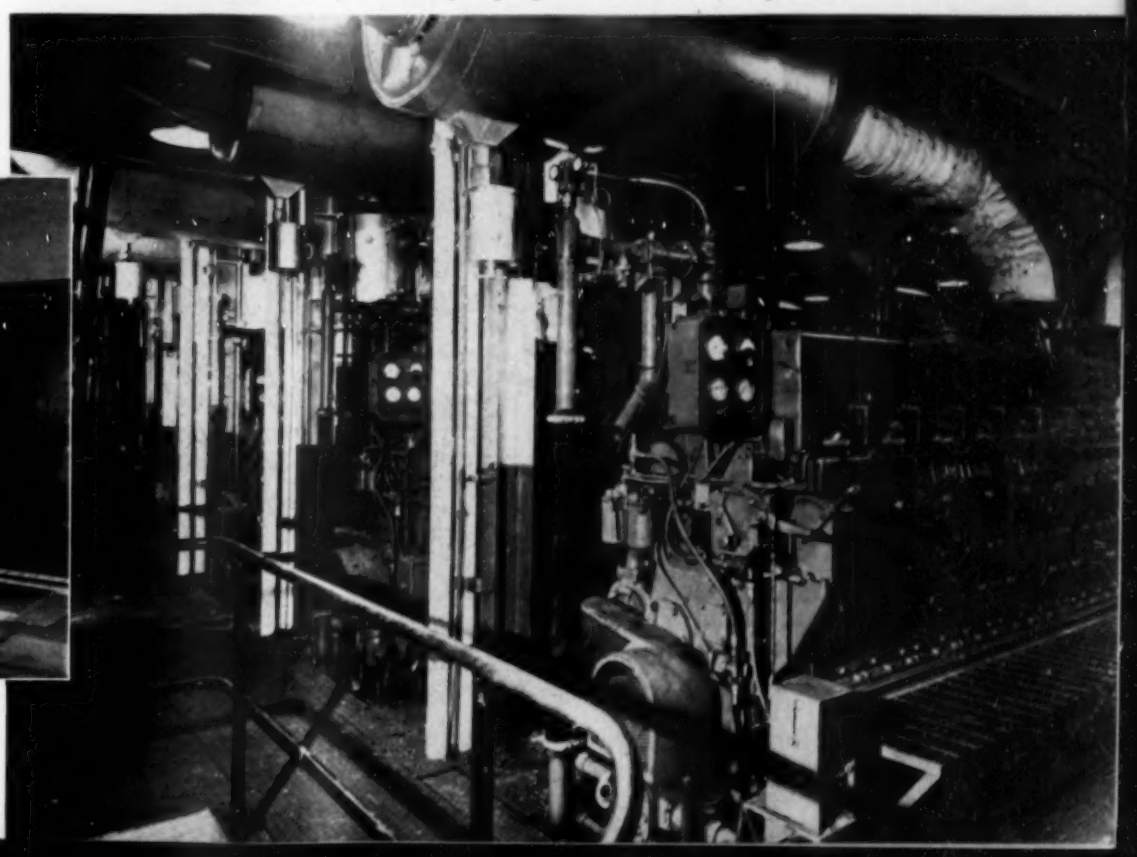
The mud mixing equipment, including two active mud tanks and a slug tank, which extend from the main deck to the second deck, also is located on the second deck, together with all valves for the three mud discharge manifolds, and the remote controls for all pumps and their drive engines, including the Gyrols, throttles, and clutches. There are also hoppers for the storage bulk mud up to 4400 sacks. A sound-proofed generator room on the second deck houses three General Motors diesel-driven 100 kw. ac. generators for the supply of all electrical power requirements, and a diesel driven arc welding machine. Distribution of the electrical power is controlled through a very complete and elaborate panel. Other facilities on the second deck include a work shop for repairs. In the hull of the barge are located in charge chambers (slush pump compounding chambers), water circulating pumps, and fuel oil pumps.

List of Equipment

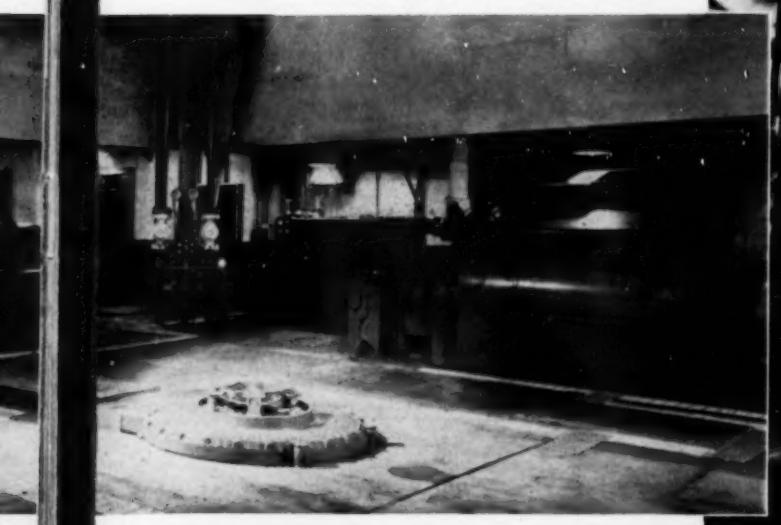
These parts are common to both the Superior PTD-6 naturally aspirated and the PTDGS-8 supercharged 8½ x 10½ engines.

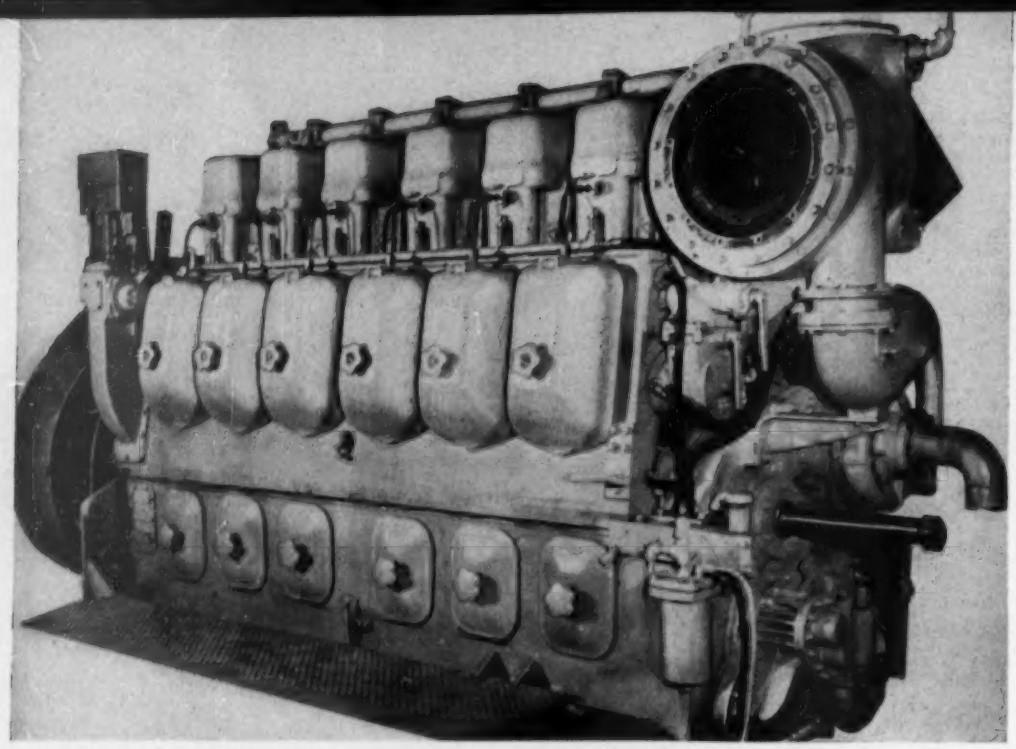
Fuel injection pumps—Diesel Engineering & Mfg. Co.
Vernatherm by-pass valves—Detroit Controls.
Lube oil filter—Purolator Products.
Fuel filter—Purolator Products.
Manifolds—Dayton Fabricated Steel Co.
Gauges—U. S. Gauge Co.
Valves & fittings—Crane Co.
Thermometers—U. S. Gauge Co.
Heat exchangers—Ross.
Exhaust silencer—Maxim.
Compressor—Quincy Compressor Co.
Regulator—Fisher Regulator Co.
Lube oil cooler—Ross.
Instrument panel mountings—Lord Mfg. Co.
Flexible hose—Aeroquip Corp.
Turbochargers—Elliott-Buchi.
Air filters—Air-Maze.

This 4-engine compound drive group on the second deck consists of four Superior PTDSG-8 diesels, each equipped with Ideal-Gyrol fluid drive. The Gyrols are linked to the pumps on the deck below by means of 2-speed pump drives with 1½-inch sextuple chain.



A section of the derrick floor showing the Ideal Type 160 rig at left with 3-engine compound to the rear. At right is the Ideal Type 130 draw works as standby equipment. The Ideal Type 205 Multimatic Rotary is in the center of the floor.





The new Alco light-weight, heavy-duty diesel. Known as the Model 251A, it is a 6-cylinder, 4-cycle turbocharged engine rated at 690 hp. at 900 rpm.

A NEW ALCO DIESEL

A new, light-weight, heavy-duty diesel engine for stationary and portable service has been announced by American Locomotive Company. The engine, known as Model 251A, is a 6-cylinder, 4-cycle turbocharged diesel of 9-inch bore and 10½-inch stroke, rated at 690 hp. at 900 rpm. The engine is intended for continuous duty or stand-by purposes and is designed for such typical applications as oil-well drilling rigs, crude oil and oil product pipeline pumping, gas pipeline pumping, electric power generation, irrigation pumping, dredging and for ortable units mounted on skids, trailers or rail cars.

The engine base and frame are structural steel, resulting in light weight with no reduction in strength, and permitting operation on light and economical foundations. Net weight of the engine is 21,350 lbs. dry and 22,500 lbs. wet. Of compact design, it is 11 feet 5 inches long, 7 feet 5 inches high, and 4 feet 11 inches wide. Power take-offs for oil-well drilling are an integral part of the engine; therefore, there is no alignment problem with the engine crankshaft and over-all length is not extended The engine incorporates proved features of both the Alco 244 series Vee-type 9 in. x 10½ in. engine and the Alco 539 series 12½ in. x 13 in. engine, in widespread use in locomotive pipeline pumping and power generation applications. The new 251A engine is the standard production engine for the Alco-GE 800 hp. switching locomotive for railroad service.

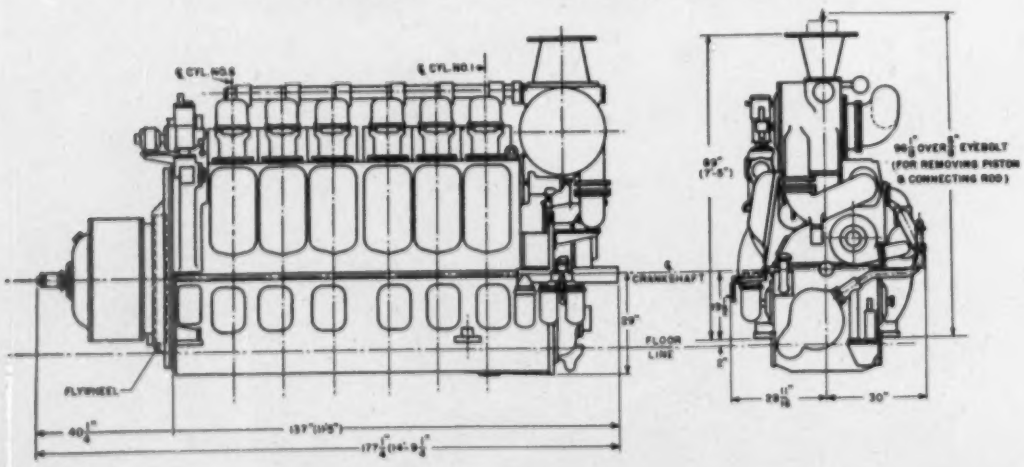
For stationary and portable service, the engine promises reduced installation costs as a result of a lubrication oil system built as an integral part of the engine and mounted on the cylinder block. The integral system includes the lube oil sump, oil pump, coolers, filters, strainers, and oil pressure regulating valve. The positive displacement, gear-type lubricating oil pump is driven by gears from the crankshaft. All engine jacket water passes through the shell-and-tube lubricating oil cooler. Two lubricating oil filters of the waste-packed type are utilized at full capacity for all engine speeds. A fine-mesh lubricating oil strainer of the screen basket type is piped to strain lubricating oil just before delivery to the engine. Air-motor engine starting is utilized with as low as 60 lbs. of air, with no high-pressure air bottles or special air compressor required. The air motor turns the engine with driven gear mounted on the flywheel.

The cylinder block is fabricated steel with forged main-bearing saddles. The block itself provides the water jacket for cylinder liners. The base, which also serves as the oil sump, is fabricated steel and is provided with four brackets for bolting to the foundation. The crankshaft is one-piece, open-hearth, forged and hardened steel, counterweighted and with seven main bearings. Connecting rods are drop-forged steel, suitable for precision-type crank-pin shells and piston pin bushing. Oil-cooled cast iron pistons are designed for long ring-land life. Cast iron cylinder heads are equipped with two air and two exhaust valves.

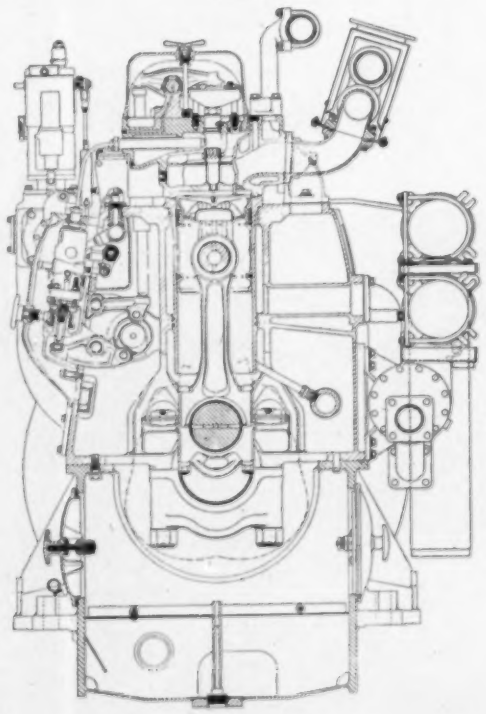
The engine is turbocharged with an Alco 320A water-cooled turbocharger with cast iron casing. Individual fuel injection pumps are mounted adjacent to each engine cylinder and completely enclosed. The governor is hydraulic type with solenoid shutdown. The mechanical overspeed trip automatically stops engine when it overspeeds. The camshaft gears are forged steel of single helical type. Barring for setting crank position is provided by a special bar designed to engage in the crankshaft flange. A crankshaft extension is provided on the free end of the engine for connection through a coupling to drive auxiliary equipment. A viscous type torsional vibration damper is applied.

A primary fuel filter of the waste-packed type and a secondary fuel filter of the paper disc type are mounted on the engine. The entire fuel system is designed to avoid lube oil dilution. A positive crankcase exhauster fan, driven by an electric motor, is mounted on the fly-wheel end of the engine.

Schematic drawing of the new Alco diesel showing the dimensions.

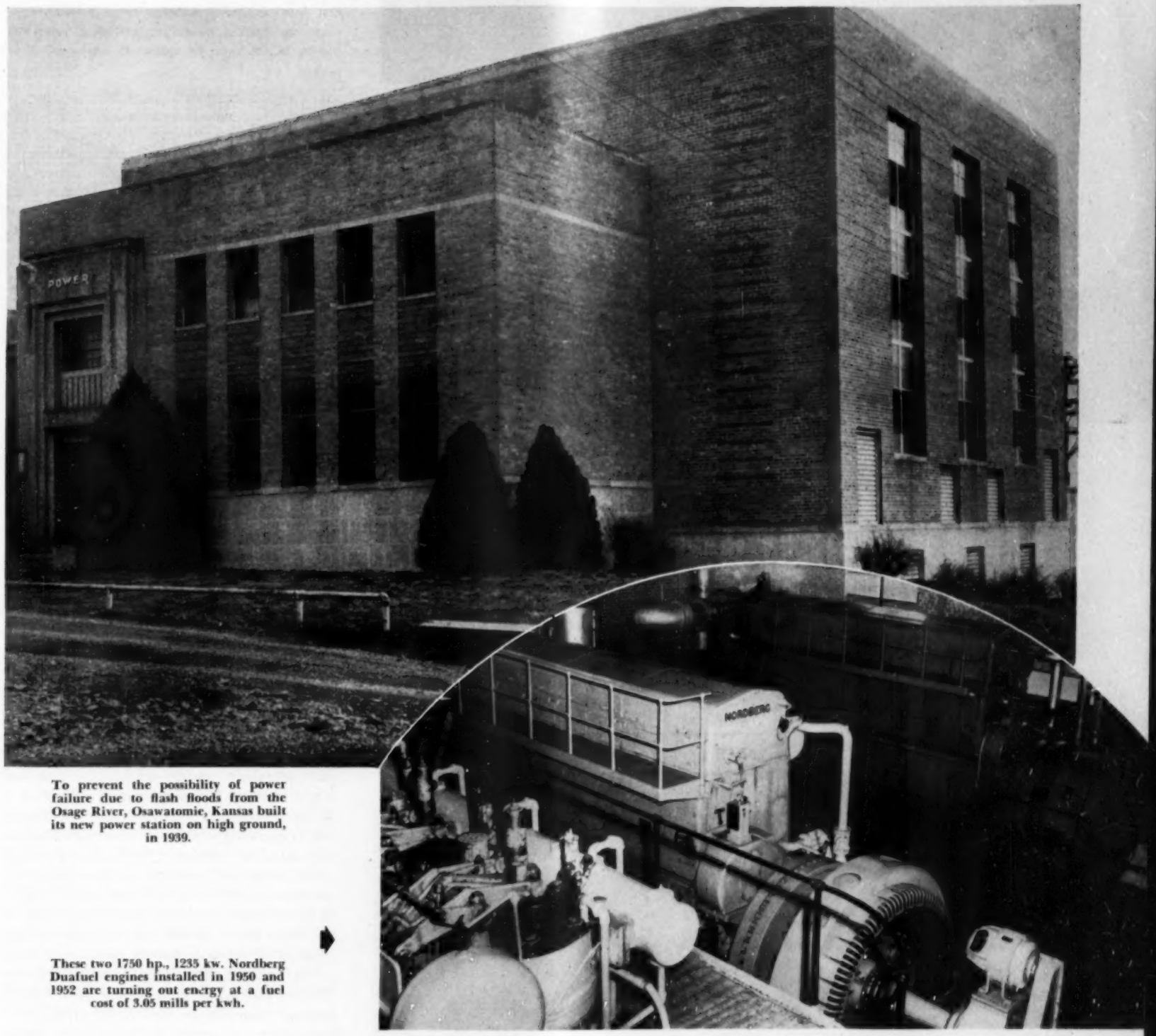


Cross-section of the Alco Model 251A diesel.



OSAWATOMIE, KANSAS

By JAMES HIGGINS*



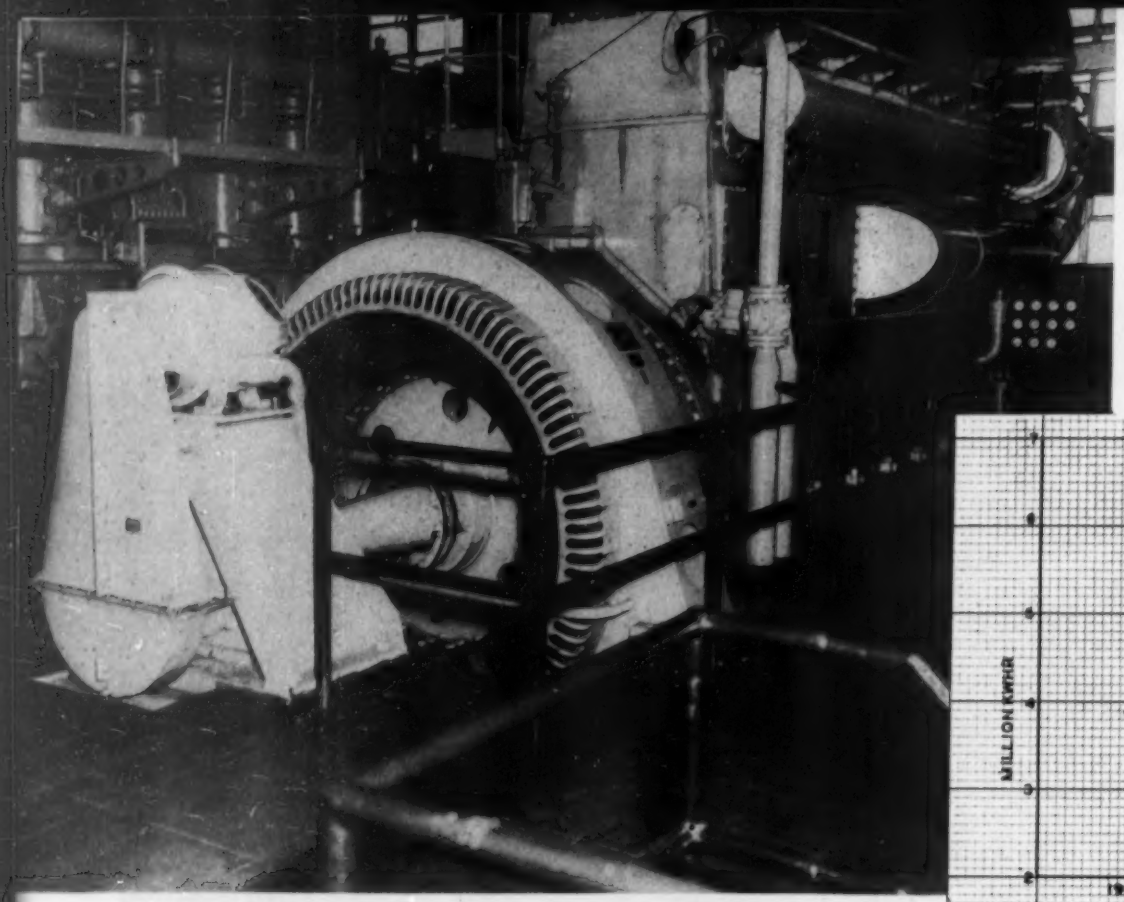
To prevent the possibility of power failure due to flash floods from the Osage River, Osawatomie, Kansas built its new power station on high ground, in 1939.

These two 1750 hp., 1235 kw. Nordberg Duafuel engines installed in 1950 and 1952 are turning out energy at a fuel cost of 3.05 mills per kwh.

TWO structures of more than passing interest share a common setting in Osawatomie, Kansas. John Brown's home is of historical interest through its past association with the struggle the free-state men were making for control of Kansas prior to the Civil War. The municipal water and light plant is of daily concern to Osawatomie citizens since it is the source of those necessary utilities that keep the community functioning. While the past history of John Brown's cabin is replete with tales of its impetuous owner, the past experience of the municipal utilities also encompass some "thrillers" almost as glamorous as those of John Brown.

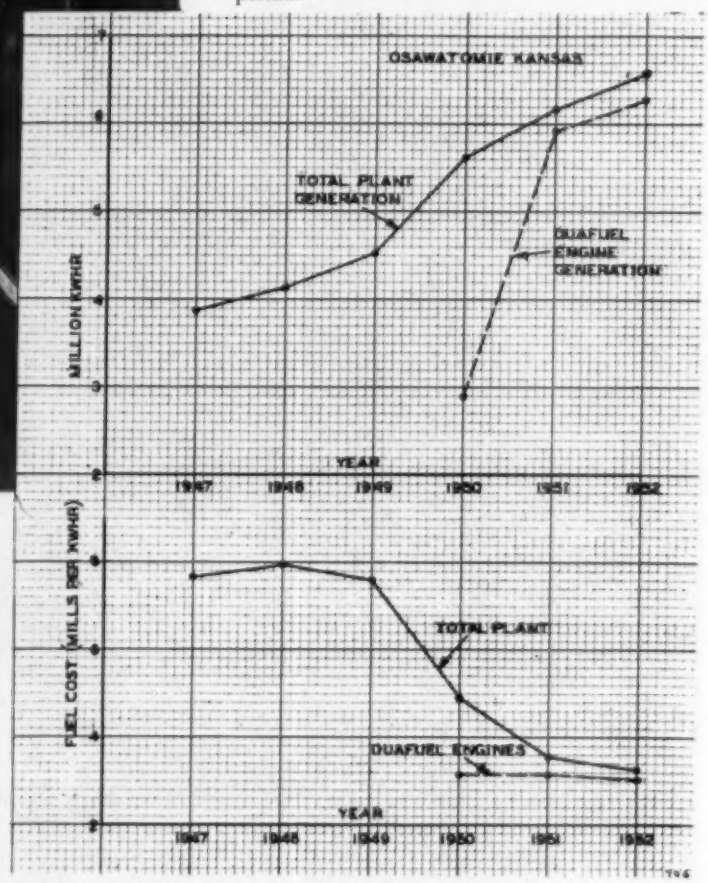
For many years the water and electric plants were located on the flood plain of the Osage River where occasional flash floods would put the plant out of commission. In 1939, Osawatomie moved its utilities away from future floods by building a new diesel-engine generating station and waterworks plant on high ground adjoining John Brown's cabin. The value of that move was demonstrated during the 1951 flood when potable water and sufficient electrical energy were available at all times in spite of the record high water. While the construction of a new plant in 1939 got rid of the flood danger, the rising cost of fuel oil resulting from World War II, was another serious problem. Natural gas was available in Osawatomie, and Nordberg Duafuel engines proved to be the answer to the high-fuel-cost problem.

**Superintendent of Utilities, Osawatomie, Kansas.*



Osawatomie's latest engine is 1750 hp. Nordberg Duafuel unit with American Motors thermostat control which drives a 1235 kw. General Electric generator. In the background is the 800 hp. McIntosh & Seymour engine installed in 1926 and now used for standby power.

The first 1,750 hp. supercharged Duafuel engine driving a 1,235 kw. generator went into operation in July, 1950. The fuel-cost reduction with the use of this machine was so marked that an old oil-burning diesel engine unit was removed in the spring of 1952 and duplicate Duafuel unit of 1,750 hp. installed in its place. This second unit started operation on July 23, 1952. Operating data from this plant for the five-year period 1948-1952 inclusive presented in Table I shows the substantial savings resulting from the switch to dual-fuel operation. On the basis of the present 9 cent fuel oil and the prevailing gas rate, the plant fuel cost dropped from 7.96 mills per kilowatt hour when burning fuel oil only in 1948 to 3.27 mills in 1952 through the use of Duafuel engines. The fuel cost for the Duafuel engines only was 3.05 mills per kwh. in 1952. The complete summary of operation is shown in Table II. Lubricating oil consumption of the first unit installed shows an average of 9,550 rated brake horsepower hours per gallon of lubricant during 18,376 hours of operation over a 2-½-year period.



This chart clearly shows the savings effected by Duafuel operation at the Osawatomie, Kansas power plant.

TABLE I

Total Plant	1947	1948	1949	1950	1951	1952
Kwh gen x 1000	3,879.9	4,130.6	4,513.9	5,614.2	6,174.8	6,579.2
Fuel oil, gal.	331,020	365,090	381,110	239,964	106,492	79,960
Gas, mcf.				32,150	67,097	77,054
Oil cost @ 9c	29,791.80	32,858.10	34,299.90	21,596.76	9,584.28	7,196.40
Gas cost				5,782.23	12,311.56	14,282.38
Total fuel cost	29,791.80	32,858.10	34,299.90	27,378.99	21,895.84	21,478.78
Fuel cost mills/kwh	7.68	7.96	7.60	4.88	3.55	3.27
Oil Burning Units						
kwh x 1000	3,874.9	4,130.6	4,513.9	2,714.2	260.9	284.7
Fuel oil, gal.	331,020	365,090	381,110	202,080	34,947	27,029
Kwh/gal. fuel	11.7	11.3	11.8	13.5	7.5	10.4
Fuel cost mills/kwh	7.68	7.96	7.60	6.67	12.0	8.65
Duafuel Units						
Kwh x 1000				2900	5,913.9	6,294.5
Fuel oil, gal.				37,884	71,545	52,931
Gas, mcf.				32,150	67,097	77,054
Oil cost @ 9c				3,409.56	6,439.05	4,763.79
Gas cost				5,782.23	12,311.56	14,282.38
Total fuel cost				9,191.79	18,750.61	19,046.17
Fuel cost mills/kwh				3.16	3.16	3.05

The two engines responsible for this reduction in operating cost—a most welcome experience for the plant operator in this day of high labor, fuel, and repair costs—are Nordberg Duafuel units. Each is an eight cylinder, 16"x22", four-cycle, supercharged engine operating at 327 rpm. Elliott turbochargers are used on both machines. Either unit can start up on oil or gas and provisions are incorporated for automatic cutover to oil fuel in the event of failure of the gas supply. When an engine is operating on gas, the governor controls both the amount of gas supplied to maintain constant speed at all loads, and the amount of air admitted to the supercharger. Pilot oil is delivered in a constant amount at all loads. During operation with oil as fuel, the governor regulates the amount of oil supplied in relation to load to maintain constant speed. The intake-air control is manually disengaged when operating with fuel oil. Variation in the amount of air supplied when burning gas is produced by an intake-air throttle valve operated by the engine governor through an hydraulic control system.

Gas for the engine passes through a pressure-controlled shutoff valve. Should the gas pressure drop below a predetermined value, the valve closes and the engine automatically shifts over to fuel oil. Gas

is admitted to each cylinder through a cam-operated poppet valve with constant stroke. Gas quantities are controlled by a regulating valve ahead of each cylinder poppet valve and operated by the governor through a shaft and linkages. Pilot oil is introduced into the cylinder through an Adeco fuel nozzle designed to work equally well with the small amount of oil required for igniting the gas or the full quantity of oil required for full-load operation of the engine. Fuel nozzles are water cooled.

The supercharger is designed to supply air to the engine at approximately 3.4 psig. Crankcase and overhead valve cover ventilation is maintained by means of a common connection between them and the suction side of the turbocharger. An oil-bath air filter is installed in the connection between the crankcase and the turbocharger intake. It is impossible to tell by the operating sound of the engine whether gas or oil is being burned in the engine cylinders. Air intakes to both engines are equipped with Burgess-Manning mufflers. The air-intake filter on first Nordberg unit consists of four 20 in. x 20 in. Midwest type panel units while on the second Duafuel unit the air-intake filter consists of six 20 in. x 20 in. Corning fiberglass disposable panels. Maxim silencers are used on the exhausts of both units, and both are housed in concrete compartments which form a part of the building heating system. Air-intake and exhaust lines from both units are extremely short.

Two independent oiling systems provide the required engine lubrication on each engine. Cylinder lubrication is furnished through a 16-position Manzel force-feed lubricator. Working parts of the engine, aside from the cylinder walls and rings, are supplied from an independent force-feed system consisting of a lubricating-oil pump mechanically driven from the engine, separate filters for the oil to the engine and to the supercharger, and a lubricating-oil cooler. An auxiliary motor-driven lubricating-oil pump for emergency and before-and-after operation is also installed. Engine cooling is provided from two sources. In the original plant design the jacket water was cooled by means of shell-and-tube water-to-water heat exchangers with the raw water supply to the waterworks plant acting as the coolant. With the addition of the two Nordberg engines, two Marley Dricooler units, each having a capacity of 1,850,000 btu. per hour have been installed and connected to the jacket-water system in parallel with the original jacket-water cooling system. Each cooler is provided with a 10 hp. motor-driven fan. Cooler capacity is based upon a dry-bulb temperature of 95°F. with an 18.5°F. temperature drop in the water passing through the coil and a 46.5°F. approach.

The gas supply to the plant is metered at a single point. Individual gas meters are not installed on the two Duafuel engines and, as a consequence, fuel-consumption performance is a combined figure for the two units since July 1952. Both Nordberg engines drive 1235 kw., three-phase, 60 cycle, 4160/2400 volt generators at crankshaft speed. Excitation is provided by shunt-ground, 125 volt, 20 kw., direct-current exciters, mounted on the outboard bearing and operating at 1,750 rpm. through a silent-chain drive.

TABLE II

Performance Data Municipal Power Plant Osawatomie, Kansas

Year	1948	1949	1950	1951	1952
Energy generation					
Oil-burning diesel	4,130,600	4,513,900	2,714,200	260,900	284,700
Duafuel engines			2,900,000	5,913,900	6,294,500
Total	4,130,600	4,513,900	5,614,200	6,174,800	6,579,200
Fuel cost, mills/kwh					
Oil-burning diesels	7.96	7.60	6.67	12.0	8.65
Duafuel engines			3.16	3.16	3.05
Total for station	7.96	7.60	4.88	3.55	3.27

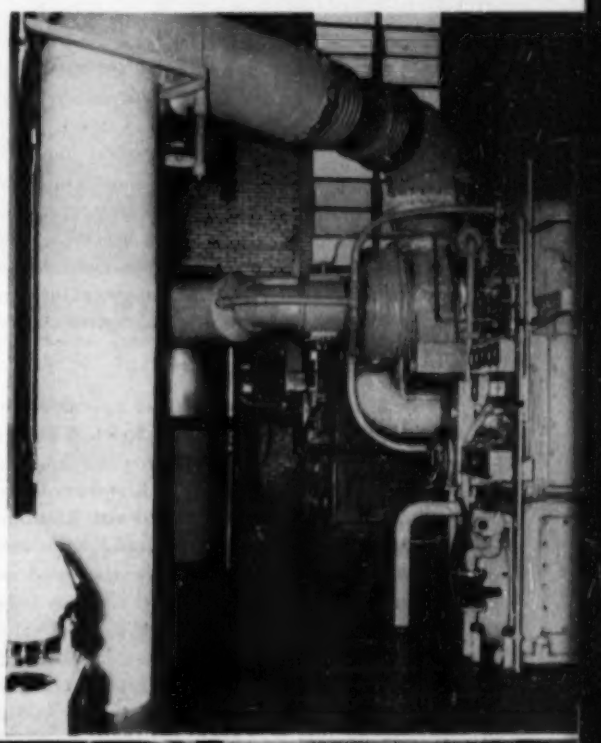
TABLE III
Station Operating Costs

Year	Total Operation Mills/kwh
1948	16.0
1949	14.9
1950	9.18
1951	6.91
1952	5.94

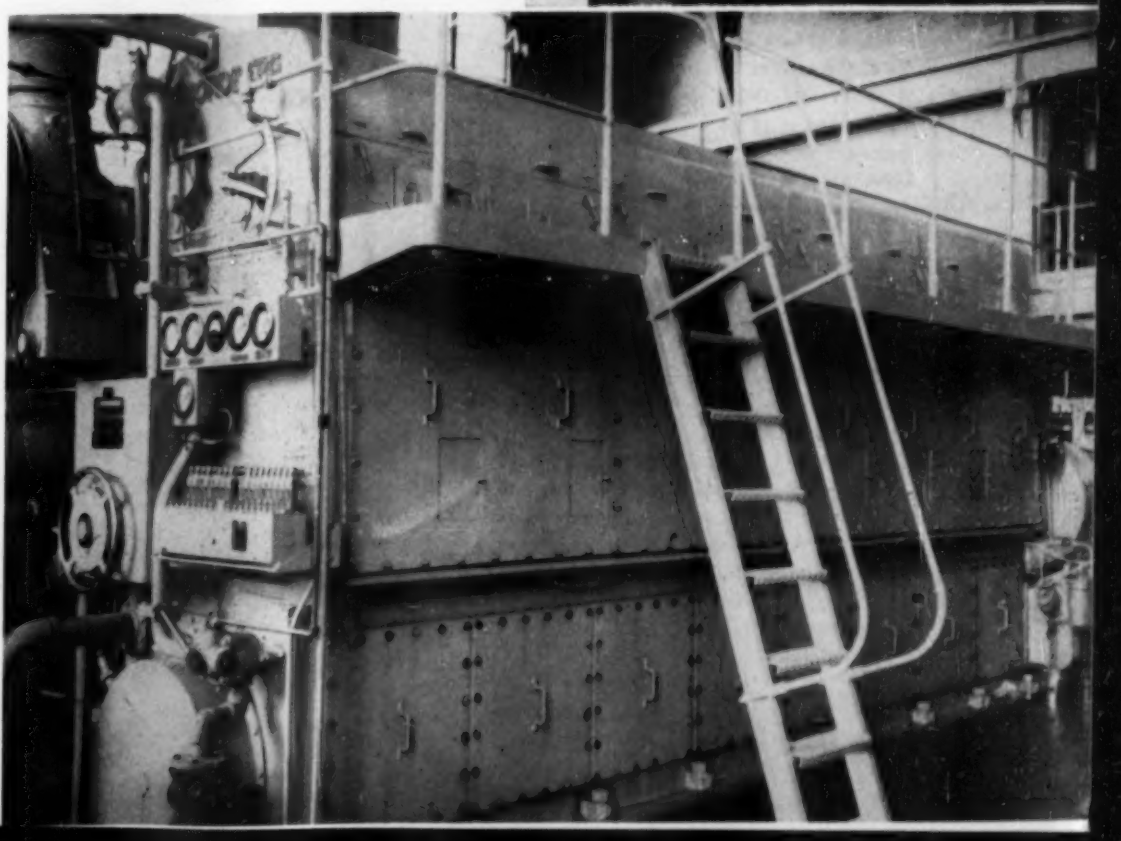
List of Equipment

Engine—Four-cycle, eight cylinder, 16 in. x 22 in. supercharged Duafuel engine rated 1750 hp., 327 rpm. Nordberg.
Generator—1235 kw., ac., 3 phase 60 cycle, 2400/4160 volts. General Electric.
Exciter—125 volt, V-belt. General Electric.
Turbocharger—Elliott.
Governor—Woodward.
Fuel oil meter—Pittsburgh Equitable Meter.
Lube oil purifier—U. S. Hoffman.
Lube oil purifier pump—Haight.
Auxiliary lube oil pump—Blackmer.
Exhaust silencer—Maxim.
Intake air silencer—Burgess-Manning.
Lube oil cooler—Ross.
Pyrometers—Alnor.

The #2 Nordberg Duafuel has an Elliott turbocharger which supplies air to the engine at approximately 3.4 psig.



Control end of the new 1750 hp. Nordberg supercharged Duafuel engine showing the Manzel force-feed lubricator, Alnor pyrometer and Nordberg gauge board.



MOI

By CHAS. F. A. MANN

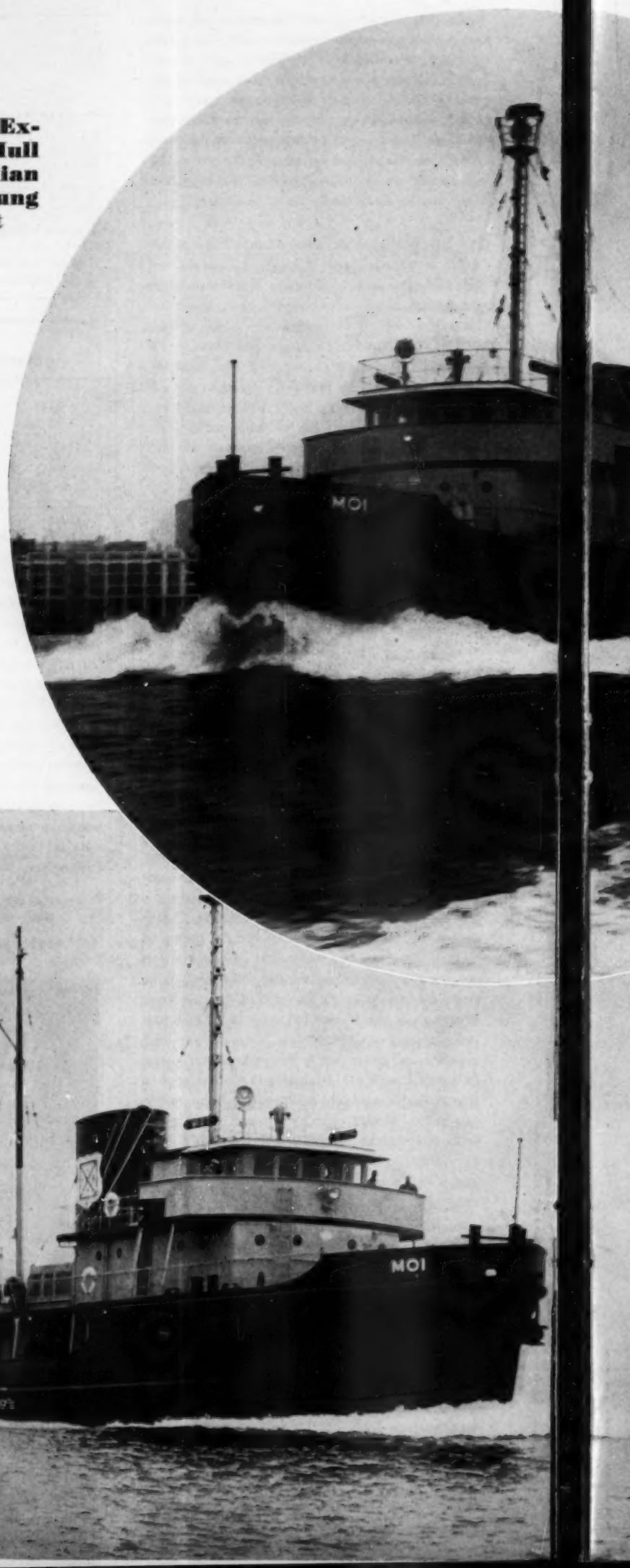
The Conversion of Ex-Army Tugboat Hull to Largest Hawaiian Diesel Tug for Young Brothers Fleet

ONE of the major conversion jobs done this Spring in any Pacific Coast shipyard was the construction of the giant twin screw diesel tug *Moi* for the Young Brothers division of Oahu Railway and Land Company Ltd. of Honolulu. Starting from a stripped hull moored on the Columbia River at Portland, Oregon, the *Moi* was re-created from a former, little-used surplus Army tug originally built at Levingston Shipyards, at the Winslow, Washington repair plant of Commercial Ship Repair Co., and is now the largest diesel tug in the Hawaiian fleet of ocean tugs used for tows between the Islands.

The *Moi* has the following dimensions: length, overall, 143 ft. 6 in.; length, B.P., 133 ft. 8 in.; beam, moulded, 33 ft.; depth, moulded, 17 ft. She was completely equipped below decks after careful survey and reconstruction from plans drawn by Carl J. Nordstrom, Seattle naval architect, and is equipped for long ocean tows. Fuel capacity is in excess of 50,000 gallons, with water storage for 5,000 gallons and 2400 gallon lube oil storage. The tug is comfortably equipped for all-weather operation and carries an oil fired hot water heating system, oil fired galley range, and forced ventilation for all crew and officers quarters. Deck equipment includes a large Markey towing winch and Sperry electro-mechanical steering gear.

The main propulsion units are two opposition rotation Fairbanks Morse diesels, Model 37-F-16, 6 cylinder, 16 x 20 engines, developing 1200 hp. each at 300 rpm. They are fitted with Kingsbury thrust bearings and are fresh water cooled with Ross heat exchangers. Small 5 hp. motor driven lube oil and fresh water circulating pumps are also fitted on each engine for use before and after running. Lube oil temperatures are maintained at constant value by the use of 4 in. Amot thermostats in each main engine lube oil line to automatically control oil temperatures and prevent manual control by the operator. Auxiliary power is supplied by two 60 kw. General Motors 6-71 diesel sets with Allis-Chalmers generators and a smaller 30 kw. set powered by a 3-71 GM diesel and Delco generator. Auxiliary power is generated at 125 volts, dc. A 15 kw. belt driven generator is fitted to one main diesel for ship's lighting and steering while underway. Twelve volt battery starting is provided for the three auxiliary generator sets.

Compressed air is provided by F-M built-in compressors on the main engines, with automatic unloaders and a 15 hp. F-M two stage motor driven auxiliary compressor. Emergency air starting is further provided for by a 5½ hp. diesel unit, hand starting. Eight 30 x 103 inch steel air bottles are provided. Maxim silencers are fitted to all diesel exhaust lines, located within the large stack. Among the extensive layout of the accessory equipment are Almor pyrometers, Fulton Sylphon valves on the main engine jacket water lines; extensive layout of Fairbanks Morse pumps for oil, fire, water, lube, bilge etc.; Market anchor and cargo winches, in



Left to right: A. M. Lindgren and E. A. Black of Commercial Ship repair; Gail Dillingham of Honolulu, sponsor; Carl J. Nordstrom, architect; Barney Featherstone, co-owner of Commercial Ship Repair; and George Hansen, assistant general manager of Young Brothers Division, Honolulu.

addition to the large Market towing winch; Viking radio telephone; Bludworth direction finder, Fathometer and a remodelled Navy type radar. With full crew sent to Puget Sound from Honolulu the *Moi* left in April to join the rest of the Young Bros. fleet which includes several of the so-called "Mikki Mikki" type tugs built on Puget Sound and at San Francisco.

DIESELS IN RESERVOIR CONSTRUCTION

Sensational Earthmoving Combined With "Proctor Control" Method of Compaction

By FRED M. BURT

THEY roar along the access roads, dip menacingly on the slopes, growl swiftly up steep grades and lunge back down again. They can turn on a dime and stop on a penny. But the brutes, for all their sound and fury, are docile diesels, instantly responsive to the slightest touch on their push-button controls. They're the LeTourneau Model C Tournamatic Tournapulls, now tracing erratic paths across the mighty basin which forms the 83,000,000 gallon Eagle Rock Regulating Reservoir for the Los Angeles City Dept. of Water & Power.

This project, begun Dec. 1951, marks the first time that these ultra-modern "push-button" diesel wonders have been pressed into service on a major Southwest earthmoving job. And what a performance they've given. At one phase of construction, three Tournapulls were clocked at handling 315 loads per 9-hour day. Each load averaged 11.7 cubic yards after compaction to 110-115%, or 140 pounds per square foot. With a speed of 36 mph. on the level, the Tournapulls are powered by 186-hp. (@ 1800 rpm.) General Motors Detroit diesels. They've proved themselves more than equal to difficulties of the terrain where grades as steep as 22% are constantly encountered. According to Bruce Kemper, Project Superintendent, Kemper Construction Co (Los Angeles), prime contractor, this is just about the toughest job ever faced by rubber-tired equipment. Kemper Construction Co. was awarded the contract for the work on its bid of $1,380,703. It sub-let the earthmoving, conditioning, and compaction work to John F. Blakemore, Monrovia, Calif., who pioneered the use of this Tournamatic equipment in Southern California. The job, according to terms of the contract, was to be completed within 600 days of its beginning (Dec. 1951). Indications are that the project, thanks to the relentless pace set by the diesel powered Tournapulls, will be completed well ahead of schedule.

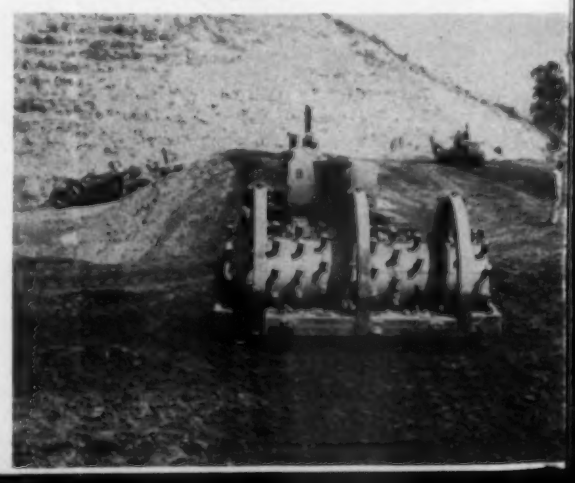
When the job is finished, 550,000 cubic yards of earth will have been moved, compacted and deposited to form a reservoir which will have the capacity to add 171,000,000 gallons of water daily to the Los Angeles water system. It involved erection of a quarter circle dam 500 feet long at the west end of the reservoir. The finished height of the dam will be 62½ feet from floor level to crest, and on the outside, 136 feet from bedrock at the downstream toe to the crest, with about 30 feet of compacted fill placed below ground level at the toe. The dam is 500 feet wide at the base and approximately 21 feet wide at the crest. It will create a reservoir 970 feet long, with a maximum width of 500 feet at the west end and a maximum width of 250 feet at the east end. The job further involved excavating the reservoir floor to bedrock and then building it up to an elevation which would permit a 57½ foot water depth. Earth for the dam came from the excavation and for the bottom build-up from a borrow area, high on the north bank.

Outside portals of outlet tunnels, 72-inch diameter at left, 48-inch diameter at right. Ingersoll-Rand compressor between supplying air for drilling holes for blasting.

In final stages of excavation, Tournamatics have about reached bed-rock. Subsequent compacted fill will come up to bottom of outlet tower in rear. Link-belt truck crane in background.

Although the Tournamatics are the most spectacular performers on this job, their work would not be possible without the assistance of other specialized diesel equipment. Among these is the Caterpillar D4 tractor which pulls the Seaman Roto-Tiller to break large chunks or rocky material in the soil for proper earth-conditioning. (Soil-conditioning and compaction must meet the rigid specifications of the proctor control method, which assures an indicated saturation penetration resistance (ispr) of 300-psi. Or, more simply, that the compacted soil when finally prepared is ready to withstand a 300 pound-per-square-inch pressure should the dam become completely saturated when the reservoir is filled.) In addition to the versatile D4 tractor, there is a Caterpillar No. 12 motor patrol to further level the fill material for compaction after it is spread by the Tournamatics and after proper moisture content is achieved. Two 30,000 pound sheepsfoot tampers, also pulled by Caterpillar D8 tractors, are used in the compaction process. The tampers themselves are unique having been designed especially for the work by South-

View from dam across floor of reservoir as average 30 ft. compacted fill nears completion. Cat No. 12 motor patrol at right. Background right is a Northwest 25 crawler crane; in foreground a Link-Belt K-360 and Gardner-Denver compressor.



Gardner-Denver, 365 cfm. compressor powered by 120 hp. Caterpillar engine, supplied compressed air for inlet tunnel. Also shown is a Caterpillar diesel-electric set.

Compaction on nearly completed dam fill using special 15-ton sheepsfoot tampers pulled by D8 tractors. In background, left to right, Tournamatic delivering earth from reservoir excavation, Seaman Roto-Tiller and a 2½ ton GM, 2250 gallon water truck.

west Welding & Mfg. Co., Alhambra, Calif. Each tamper has two drums of 4 inch steel, 4 feet dia. x 5 feet wide, with six rows of 13 hardfaced teeth welded to each drum. Four teeth, with a total tip area of 40 square inches, engage the earth simultaneously as the drums revolve. This applies the full weight of compaction pressure.

To get excavated material up to the dam construction site, a highly efficient method of earthmoving was employed. Two high-output Caterpillar D8 tractors, with power stepped up from 130 to 165 hp. were maintained in the borrow areas with scraper blades to pile up fill material and to push-load the mammoth Tournamatic Tournapulls. The dam was built up in six inch lifts, leveled, and then compacted by a minimum of 16 passes by the previously mentioned sheepsfoot tampers. The reservoir floor was built up in the same manner, with the earth being subjected to the same conditioning and compaction.

A 1037 foot long tunnel, driven through a ridge at the east end of the reservoir at a rate of 25 feet per day, carries a cement-lined and cement-encased 84 inch dia. steel pipe connected to the Metropolitan Water District pipeline. In tunneling, Kemper crews drilled 30-35 holes per 4½ foot round for blasting. For this operation they used a 365 cfm Gardner-Denver diesel compressor, and a drill jumbo with two drifters. The 84 inch pipe was placed in 60 foot lengths; two 30 foot lengths being carried on dollies riding the specially constructed narrow gage railway. The two lengths were arc-welded together in the tunnel and transferred to brackets in the steel I-beam supports.

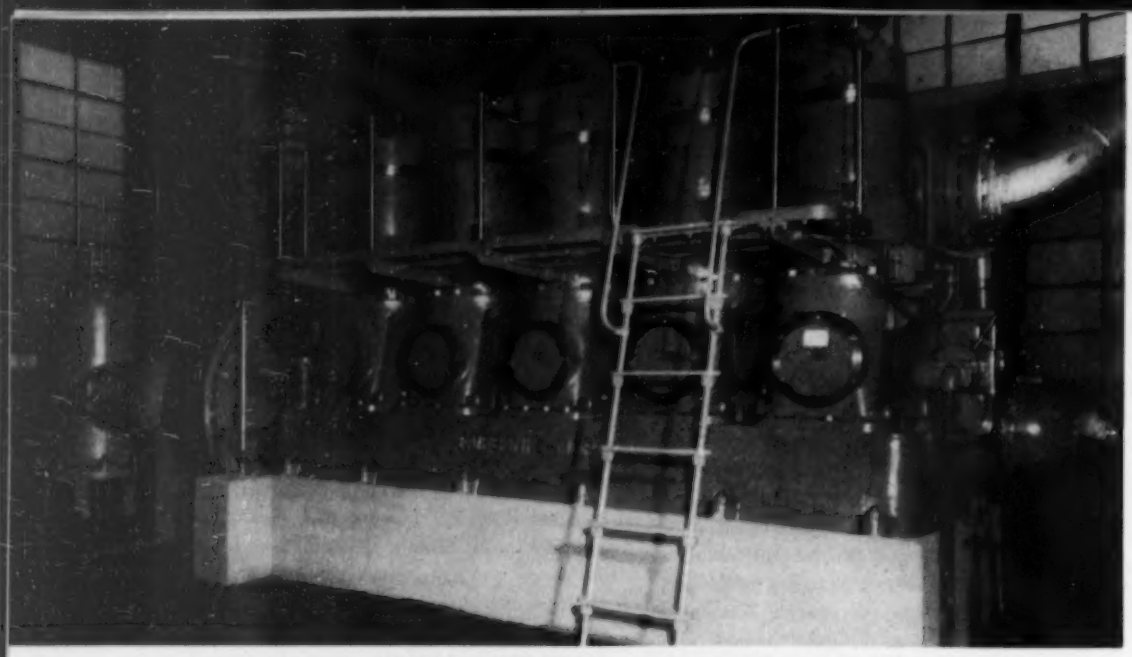
The pipe is being encased with concrete by a 1½ cubic yards Flocrete pneumatic placer, loaded at the portal, then hauled in by a special Flocrete diesel-electric locomotive, to point of pour. Designed and built by Flocrete Mfg. Co., Los Angeles, the locomotive has a power plant which consists of a Caterpillar D-311, 35-hp. diesel engine connected to a specially wound 25-kw., dc. generator which in turn drives two 15-hp. General Electric traction motors. Speed variations are effected with a dc. hand controller. When the engine is idling or for slow travel speeds, the lowering of the diesel rpm. reduces the generator voltage, (about 40 volts at 600-rpm). When a quick, heavy load is imposed on the locomotive, an open throttle brings the rpm. to 1200, with voltage build-up to about 96, but with a lag to provide smooth speed changes with high torque, a result of the under-compounded, special generator winding.

Therefore the engine builds up to full rpm. before it can be subjected to heavy loading. This performance cannot be achieved when using the conventional, direct-coupled combination of transmission and clutch. The possible diesel engine smoking (from imposition of heavy loads at low speeds, before rpm. build-up) is eliminated; the removal of a condition that would preclude use of a dieselized unit in a closed tunnel. The locomotive fuel consumption averages from 4 to 5 gallons of diesel fuel oil per 8-hour shift. Two outlet pipelines, (48 inch diameter, for water distribution in the local areas, and 72 inch to feed the Rowena, Silver Lake, and Hollywood reservoirs) run from the outlet tower and through 350 feet long tunnels constructed by approximately the same methods as the inlet tunnel.

Between the inlet tower, yet to be built but approximating the completed outlet tower, a 72 inch by-pass line has been laid under the reservoir to the latter floor. The reinforced concrete outlet tower, 95¼ feet high from sub-base to top of control house, 20 feet outside diameter, rests on a 44 feet diameter, 6½ feet thick concrete slab, walls with variable thickness, 46 inches at bottom, 8 inches at top. Concrete placing was done in 15 feet lifts; work at high elevations using Link-Belt 70 diesel truck crane with 110 foot boom and ¾ cubic yard Garbro Bucket. One-man high-cycle, McGinnis electric vibrators, with remote power control from small generators on the ground, were used to settle poured concrete. Overflow water will be carried away by a spillway, 30 feet long, located five feet below the dam crest, through a 395 foot long, 48 inch dia. reinforced concrete pipeline in the dam abutment, to an energy dissipator, thence through a 24 inch pipe connection to a storm drain. About 2000 feet of 6 inch tile subdrains were built into the dam.

More than 8000 cubic yards of structural concrete work was required for reservoir towers, spillway structure and pipeline encasements. Kemper erected his own concrete plant about equi-distant from the reservoir and inlet tunnel portal. Batches were hauled in Challenge 3½ cubic yards truck mixers. The Kemper designed batch plant has a storage capacity of about 100 tons of the different aggregates, with a 250 barrel silo for cement. Besides project will include the laying of a 3 inch asphalt concrete placing in tunnels, final work on the pavement on the inside face of the dam to protect it from possible wave erosion, and the construction of access roads.

Tournamatics easily negotiate 22% grades with 20-ton loads of earth from reservoir bottom to top of dam.



One of the three 32E14 Fairbanks-Morse diesels and Farrel-Birmingham right-angle drive which turns the 48-in. F-M vertical propeller pumps.

INDIAN GRAVE DRAINAGE

Three New 48-In. Fairbanks-Morse Pumps Powered by 375-Hp. F-M Diesels Pump Acre-Ft. for 24.6 Cents at Quincy, Ill.

By W. H. KLINGNER* and M. B. CARROLL JR.

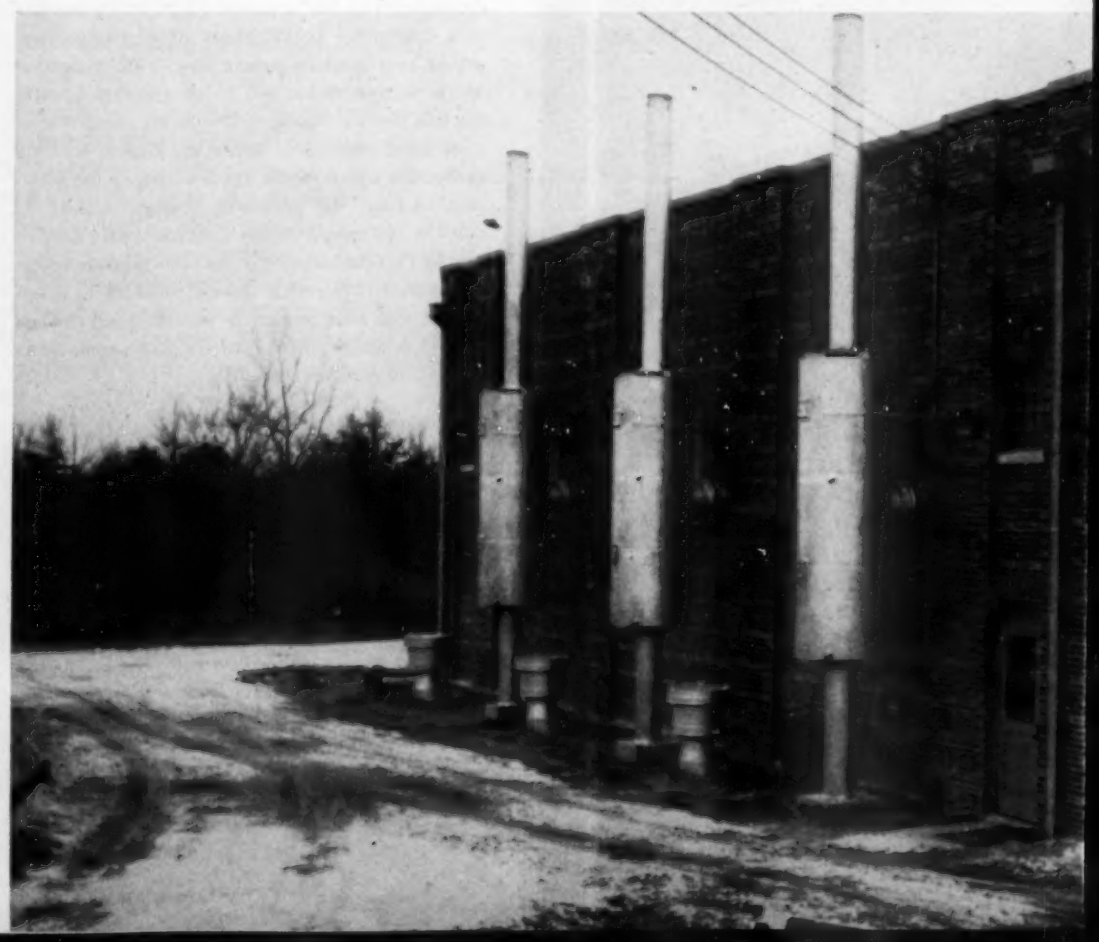
INSTALLATION of three new 48-in. Fairbanks Morse vertical, propeller pumps driven by 375-hp. F-M diesels has saved Indian Grave Drainage District in Quincy, Illinois, more than 34 percent in pumping costs. Installed because of the lack of capacity of the original, electric-motor-driven equipment and an impending increase in purchased power rates, these new pumps, with their increased efficiency, have reduced horsepower-hours per unit of water pumped by no less than 25 percent. In 1952, with the new diesel-driven pumps in service, total cost per acre-ft. was just 24.6 cents. If the pumping had been accomplished with the old electric-driven pumps at current power rates, total pumping cost would have been at least 37.4 cents per acre-ft.

Organized in 1880 under the Levee Act of Illinois, the District is designed to permit the farmers to get a crop each year from what was formerly marginal land along the banks of the Mississippi. Serving an area of 18,300 acres, the District drains a watershed of 20,112 acres and is responsible for an annual increase in crop value of $10.00 per acre for each of the 150 farms in the District. From 1880 until the original pumping plant was constructed, it was operated as a gravity district. The first pumping station, constructed in 1918, operated three 36-in. centrifugal pumps, each with a capacity of 36,000 gpm. at a discharge head of 17.5 ft. Two of these units were on a common shaft and were powered with a single 400-hp., 3-phase, 25-cycle electric motor while the third unit was driven by a similar 200-hp. motor. Originally, these pumps were operated at 355 rpm. with a capacity of 87,000 gpm. (total) at 16.5 ft. static head and 108,000 gpm. at 7 ft. static head. These were theoretical capacities but the cost of operation for the amount of water pumped was excessive and, in 1927, the original chain drives were replaced with V-belt drives which turned the pumps at 295 rpm. with a corresponding drop in capacity but with an increase in efficiency of approximately 30 percent. As operated, the plant had a total capacity of 62,000 gpm. at 16.5 ft. static head and this represented only 53 percent of the originally recommended capacity and resulted in inefficient drainage of the lower-lying land in the district.

Toward the end of World War II, the local power company notified the District that they would replace their 25-cycle equipment with 60-cycle equipment as soon as possible after the end of the war and that, further, the previously favorable rate schedule for nightime pumping operations would be increased approximately 47 percent. This gave the District three choices: (1) purchase new electric motors and switchgear and face a 47 percent increase in power costs with admittedly inefficient pumping equipment or (2) construct an entirely new electrical plant with new pumping equipment and still be faced with the increased power rate, or (3) construct an independent diesel plant. Mr. W. H. Klingner, consulting engineer of Quincy, was retained by the District to make a study of the three alternatives. Careful engineering and cost studies showed that the case for the entirely new diesel-operated plant offered the greatest savings over a 20-year period with lower operating costs more than offsetting the higher initial investment. Governing the decision to build the diesel plant was not only the low capacity of the existing plant but also the fact that the building had started to settle on its untreated piling, causing bearing problems; the fact that the equipment, because of its low elevation, was in danger of being flooded out during high water periods; and the fact that new prime movers operating vertical propeller pumps could be placed above any flood dangers.

The plant was designed for a capacity of 180,000 gpm. at 16 ft. head and incorporates the Fairbanks-Morse Fig. 6310, 48-in. submerged propeller pumps powered by Model 32E14 F-M, 5-cylinder diesels each rated 375 hp. at 300 rpm. and driving the pumps through Farrel-Birmingham right-angle gear drives. One unit is considered a standby unit.

View of the plant showing the Maxim silencers and the Air Maze intake filters.



*William H. Klinger & Associates, engineers

except for emergency peak conditions, based upon the following design loads:

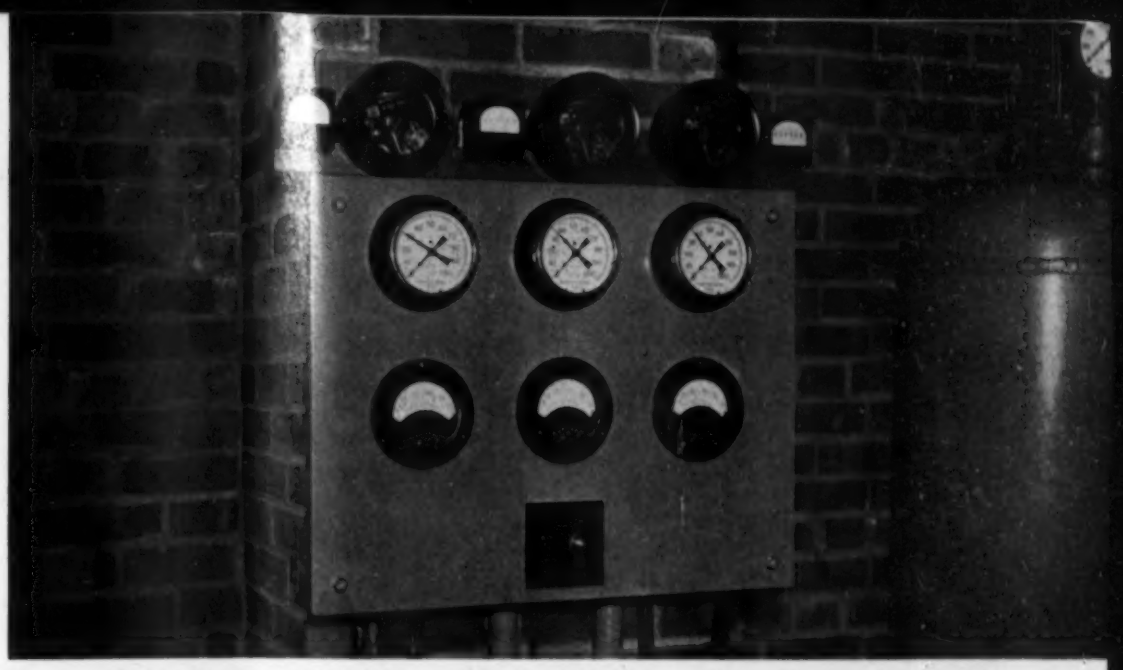
0.395 in. off the watershed in 24 hrs. at 22 ft. TDH
0.420 in. off the watershed in 24 hrs. at 16 ft. TDH
0.520 in. off the watershed in 24 hrs. at 10 ft. TDH

The decrease in TDH accompanying the increase in anticipated rainfall is based on the assumption that the level of the river will not rise as fast as the level in the District and on the assumption that higher water levels within the District are permissible during periods of heavy rainfall.

Construction of the plant was accomplished in 1951 and 1952 by J. M. Foster & Co. of Gary, Indiana. The first unit was put into operation in August of 1951 and it immediately picked up the entire pumping load. The remaining units went into service in the summer of 1952. The plant is located about fifty yards from the original pumping station which still serves as a home for the present operator. Mr. Andrew B. Henderson, who, with his wife, takes great pride in maintaining the immaculate appearance of the plant and the surrounding grounds.

Perched on the levee to the east of the new brick building are the two 10,000 gal. fuel oil tanks which feed by gravity to the fuel oil flow controller and the suction of the fuel oil pumps. Regular fuel oil is brought in by tank truck. Over the same levee pass the three 54-in. discharge lines which terminate in 72-in. plate steel flap gates, the tops of which are one foot below the normal discharge pool level. Such is the power of these pumps that water is thrown 20 ft. into the air when the engines are first started.

The silencers and air intake filters are also located on the east side of the building while the intake bay, an enlargement of the original bay, is on the west side. This intake bay is fed by two large drainage ditches which are, in turn, fed by a network of smaller drainage ditches which criss-cross the



One compact panel holds exhaust pyrometers, engine-hour meters, pressure gauges and alarms for all three of the diesel engines.

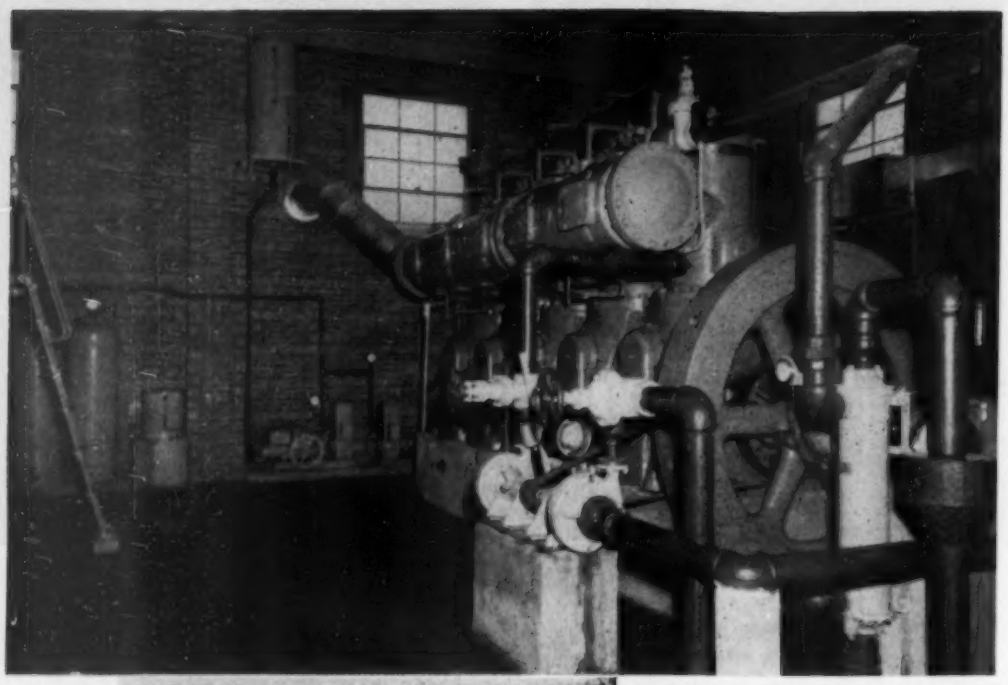
District. The interior of the plant has brick walls and a red concrete floor while the engines are painted a light grey. Along the east wall are located the six compressed air tanks for the starting system. Two compressors have been installed; one is motor-driven for normal service while the other is gasoline engine driven for emergency use. Lubricating oil is drawn from the crankcase and circulated through a continuous refining unit before being returned to the individual engine reservoirs. Each of the reservoirs is equipped with a sight glass which performs the dual function of indicating oil level and showing the condition of the oil. When make-up oil is required, it is drawn from a 200-gal. storage tank which discharges directly to the lube oil system. Maximum oil level is held to 8 in. below crankshaft centerline while the minimum level is 14 in. below crankshaft centerline. A No. 30 detergent oil is used.

Treated water is used for jacket cooling and is circulated through the shell side of a shall-and-tube heat exchanger by a small centrifugal pump. Raw water for the tube side is drawn from the discharge of the main pump and circulated through 4-in. lines by another pump. A 100-gal. makeup water tank is fed from the plant's potable water system and feeds by gravity into the cooling system whenever makeup is required. The cooling system vent lines discharge to this tank. The fuel system takes fuel oil by gravity from either of the two 10,000-gal. tanks mounted atop the levee. Fuel to each engine is strained and metered and the flow is regulated according to demand by a Struve oil control unit. This control eliminates the need for a day tank. Any excess oil fed to the engine is returned to the control unit which will then refuse to admit more oil from the storage tank until the excess in the control unit has been used up.

Operating costs have been reduced with the diesel installation and are not only lower than previous operating costs when running the electrically-powered pumps but are also much lower than would be possible even with new and highly efficient electrical equipment. District costs are generally computed on the basis of cost per acre-ft. of water pumped. In 1952, the first full year of pumping with the new pumps, total costs exclusive of dike and ditch maintenance amounted to 24.6 cents per acre-ft. In 1952, the plant pumped 24,332 acre-ft. of water, operated 2212 unit-hours and consumed 27,600 gal. of fuel oil at $0.107 per gal. Plant costs were as follows:

Fuel Oil	$2,953.20
Lube Oil	541.65
Operator's Salary	2,400.00
Maintenance and Misc.	100.00
Total Cost	$5,994.85

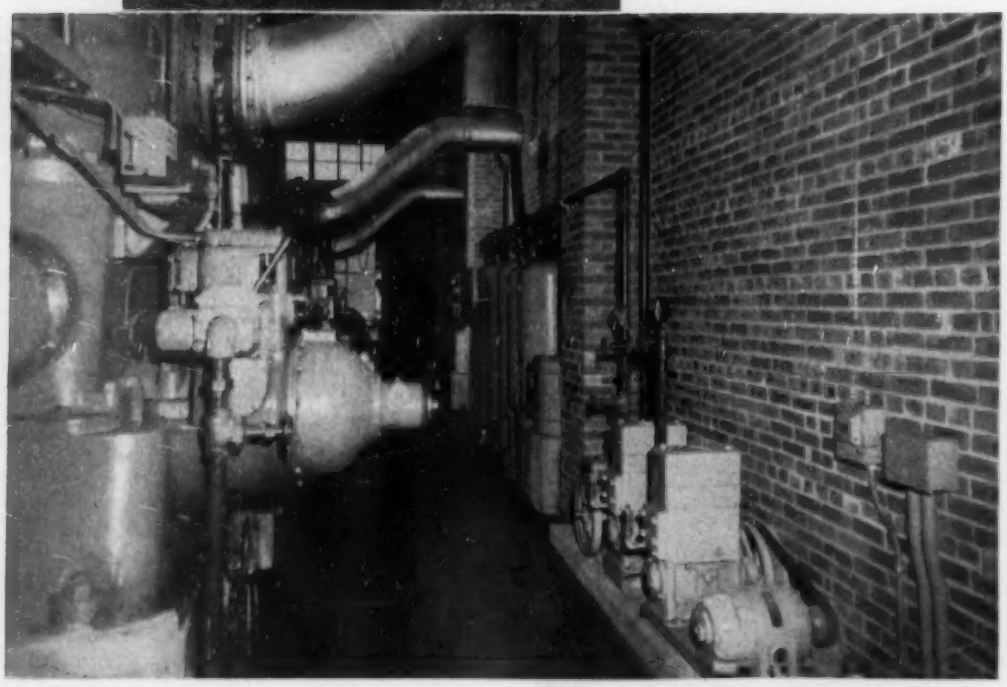
To determine what it would have cost the District in 1952 if the old motor-driven pumps had been retained, we consult figures for 1946, a typical year prior to the installation of the new equipment. In that year, the plant pumped 28,328 acre-ft. and used 600,560 kilowatt-hours of purchased power. Here is the cost picture with power at rates now prevailing:



Belt-driven from a pulley on the drive shaft, jacket water and raw water pumps are mounted on a common shaft. Make-up tank for jacket water system may be seen mounted on wall at rear. Ross heat exchanger is at extreme right.

Spray flies more than 10 feet into the air as the first slug of water from the pumps hits the discharge pool.

The motor-driven and engine-driven F-M starting air compressors are in the right foreground while the compressed air storage tanks may be seen in the background just past the oil reservoir for No. 2 engine.



Power (at $0.015 per kwh.)	$ 9,008.40
Lube Oil	41.97
Operator's Salary	1,236.00
Maintenance and Misc.	310.66
Total Cost	$10,597.03

Thus, costs would have been at least 37.4 cents per acre-ft. rather than the 24.6 cents achieved with the new diesel-driven pumps.

Of interest is the reduction in horsepower-hours required for pumping a given amount of water. In 1946, the 200-hp. electric motors operated for 5314 unit-hours which is 1,062,800 rated hp. hr., an average of 37.5 rated hp. hr. per acre-ft. pumped. In 1952, the 375-hp. diesels operated for 2212 unit-hours which is 829,500 hp. hr. an average of 34.0 rated hp. hr. per acre-ft. pumped. This means a reduction of 9 percent. Actually, rated hp. hrs. do not tell the whole story. In 1946 the electric motors used 21.2 kwh. of purchased power per acre-ft. pumped. Diesel performance was not in electrical units, of course, but fuel consumption was just 1.13 gal. per acre-ft. pumped in 1952. Indicating a reduction in energy consumption of at least 25 percent. The average annual assessment (assessment varies according to ground elevation) is $1.53 per acre which, on the 18,300 taxable acres, gives the district an annual income of $28,000.00. This amount must cover all direct and indirect costs as well as levee and drainage ditch repairs. The cost of the new plant is covered by a special assessment of approximately $1.00 per acre per year for 20 years, thus raising the total assessment to approximately $2.50 per acre per year. With the annual crop value increased by $10.00 per year as a result of proper drainage and insurance against flood damage, the farmers of the district gain an average of $183,000.00 a year in income. With total operating costs, including plant operation, amortization of investment and maintenance of dike and ditches at $46,000, the net return from operation of the drainage district is an impressive $137,000.00.

The Indian Grave Drainage District is operated under the supervision of three Commissioners: Stanley Earel, Leslie Stuffing and Herman Hilgenbrink. Two former Commissioners who served during the development of the new project were: Lewis Barnes and Charles Smith. Penick and Penick acting through Alfred M. Wooleyhan represent the District as Attorneys.

List of Equipment

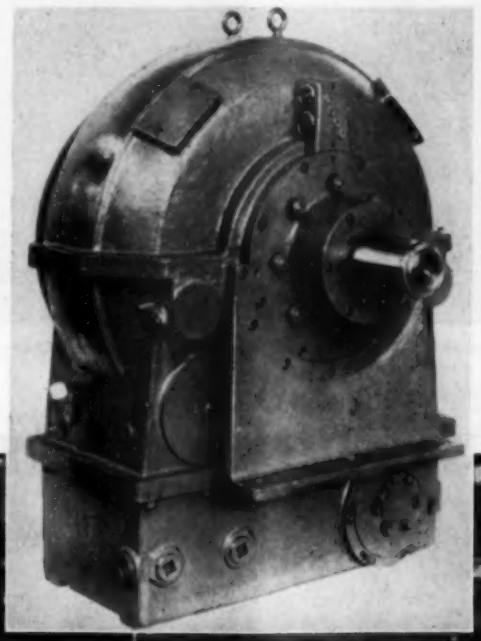
Engines—Three 5-cylinder, Model 32E14, 375-hp. diesels operating at 300 rpm. Fairbanks, Morse.
Pumps—Three 48-in. Fig. 6310, 60,000 gpm. at 16-ft. THD, submerged propeller pumps. Fairbanks, Morse.
Drive—Farrel-Birmingham.
Cooling water pumps—Fairbanks, Morse.
Fuel oil unloading pump—Fairbanks, Morse.
Lube oil filters—U. S. Hoffman.
Fuel oil control—Struve.
Silencers—Maxim.
Air filters—Air-Maze.
Jacket water coolers—Kewanee-Ross Corp.
Air compressors—Fairbanks, Morse.
Lube oil—Standard Oil Co. (Indiana).
Fuel oil—Standard Oil Co. (Indiana).
Pyrometer—Alnor. Illinois Testing Laboratories.

NEW HYDRAULIC TORQUE CON[illegible]
BY NATIONAL SUPPLY COMP[illegible]

Operating members of the new National torque converter are the driving member or pump (left), the stator (center) and the driven member or turbine (right). The housing (extreme right) is bolted to the pump and turns with it.

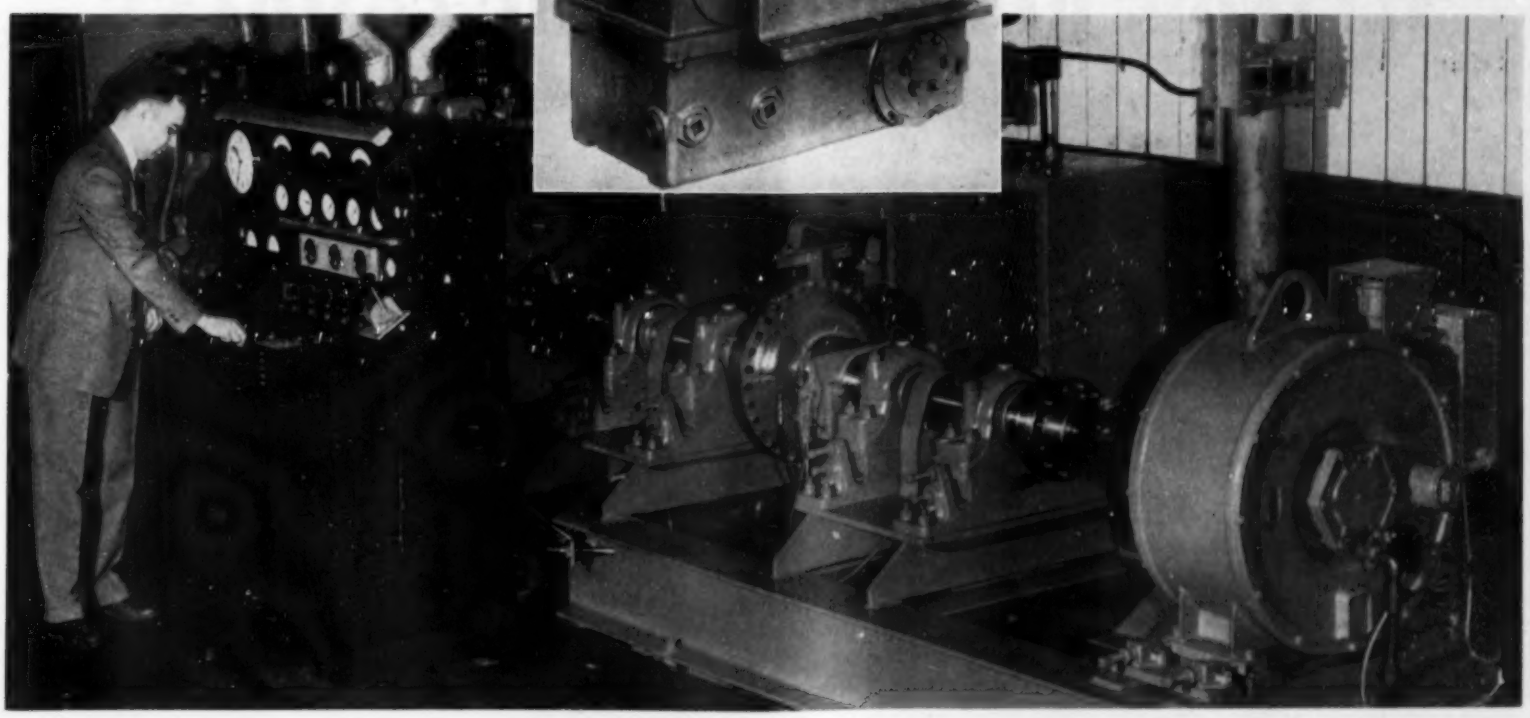
TWO hydraulic torque converters, newly designed for use with high-torque, medium-speed engines has been announced by The National Supply Company, Pittsburgh, Pa. The new National hydraulic torque converters, which were designed by National engineers, cover a power range of from 325 to more than 1000 horsepower. Performance characteristics and heavy-duty design were provided to meet the service conditions of many industrial applications where inherent smoothness of a hydraulic drive is advantageous in handling continuously fluctuating loads or to start and accelerate heavy loads repeatedly. Such service conditions are encountered in power shovels, hoists, cranes, switching locomotives, logging equipment, well drilling rigs, and other industrial operations. In this type of service engines can operate at peak performance with no lugging, since the converter automatically varies the output speed and torque multiplication instantly as the load changes.

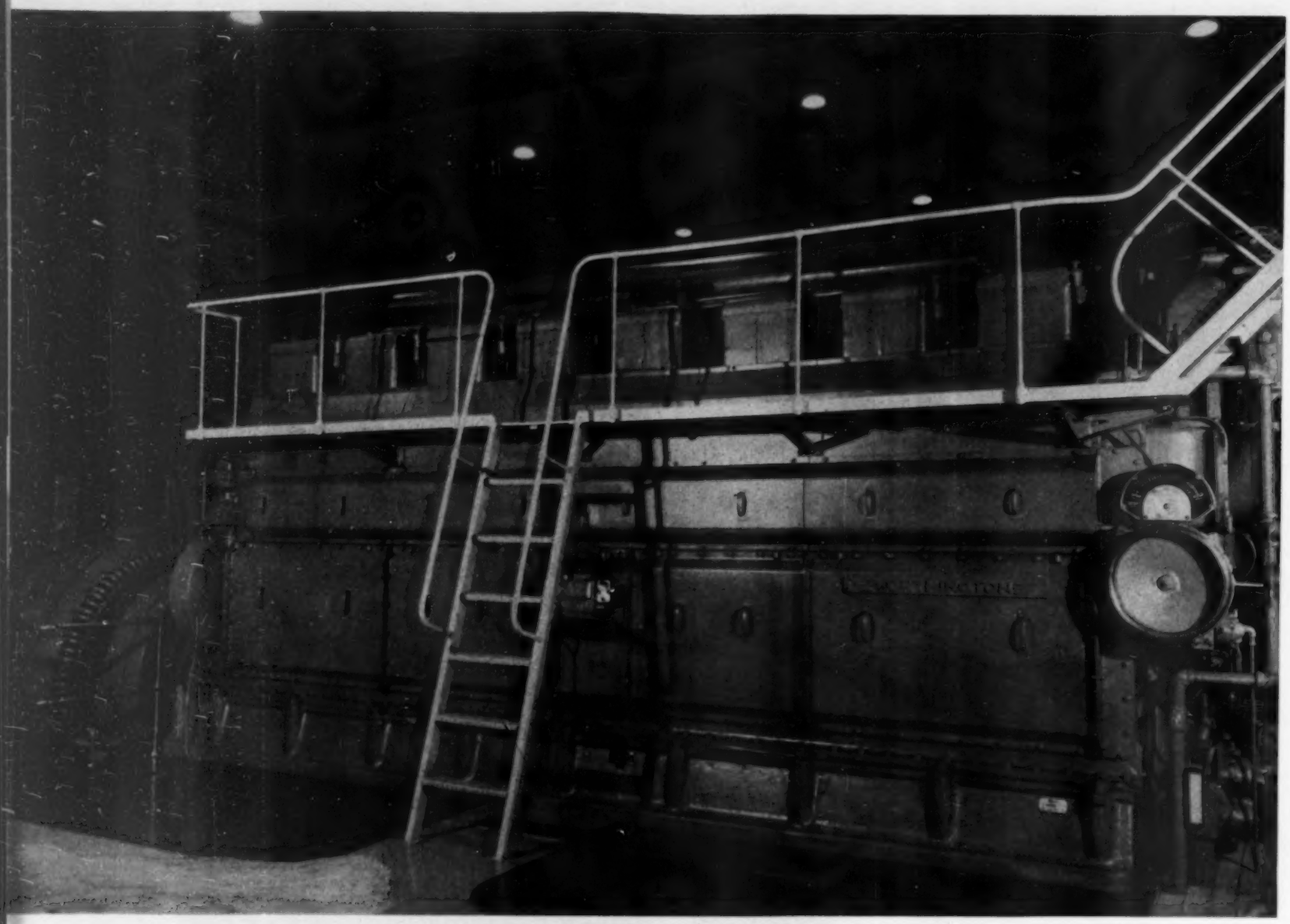
National Supply Company's new hydraulic converter was designed to cover a range from 325 to more than 1000 hp.



The National torque converter lengthens the life of both engine and driven equipment because it acts as a cushion, smoothing the flow of power and preventing transmission of shock and vibration in either direction. Both converters, the 29½-inch Type A-295-F and the 34¼-inch Type A-342-F, are mounted on a standard No. 00 flywheel housing and add only 36½ inches to the over-all length of the engine.

The National hydraulic torque converter on the test stand. It is mounted at the center of the shaft with drive end at left and driven end on the right.





The Worthington SEHGO-8, 16-in. stroke by 20-in. bore, 360 rpm., 4-cycle, supercharged dual-fuel engine with Elliott generator.

ILLINOIS RURAL ELECTRIC COMPANY

By VOLNEY M. HOLMES*

ILLINOIS Rural Electric Company, an R. E. A. cooperative, with its head office at Winchester, Illinois, now serves 7,563 members. Its two generating plants with interconnecting line and with transmission and distribution systems are self-sufficient. They are independent of any other power system. From its two power plants, totaling 6,680 kw. generating capacity, approximately 2,880 miles of transmission and distribution lines transmit electrical energy to members in nine Mississippi and Illinois River valley counties. Four counties: Pike, Calhoun, Scott, and Greene are served entirely by the cooperative. Partially served are Morgan—southern and western half, and Cass—southwestern third. Also receiving service from the cooperative are five consumers in Adams and fifty in Jersey County.

From the beginning, under the expert direction of Stanley R. Faris, manager, and Harry F. Collins, assistant manager, Illinois Rural Electric Company has had a phenomenal growth. In 1938, when the Winchester power plant went on the line with three 400 kw. Busch-Sulzer diesel-electric units, there were only 600 members. This was just about one consumer per mile of distribution line. During the first year, each member used about 75 kw. hours of electricity per month—mostly for lighting. Multiplying its uses from year to year, has raised overall monthly consumption, so that today it is 2.4 times the original, or about 180 kw-hrs. per month. This represents an increase of about 17% per year per month. Concentration of consumers has also increased so that there are now an average of 2.3 per mile of distribution line.

Farms in this area normally range in size from 160 to 240 acres. Farming is diversified. Principal crops readily lending themselves to soil building and rotation are corn, oats, wheat, soybeans, and alfalfa. Supplementing these are dairying and raising of poultry and hogs. In this area, also, are two big cattle feeders. Progressive farmers are greatly benefiting from electricity available to them 24 hours a day. It helps alleviate the labor shortage and provides a means for greater income from increased production and better marketing. Electric powered equipment performs such chores as pumping water, grinding and mixing feed, and milking. Grains, in many instances, are harvested "green," dried and sold in strong markets, thus, taking advantage of market prices better than those prevailing at harvest time when nature is normally allowed to take its course.

More and more, in pig raising, electricity is com-

Engine Division, Worthington Corporation

ing into its own by replacing one of the functions of the brood sow. Shortly after birth, pigs are transferred to brooders equipped for feeding and for maintaining an even temperatured, healthful atmosphere. This arrangement diminishes mortality rate by at least two per litter. Infant pigs cared for by the sow are always facing the hazard of being mashed. By eliminating lactation periods, production of farrowing hogs may be stepped up 50%—from two to three litters per year. Electrification results in more frolicsome pig life, while hog raisers gain over 50% more production on a small investment.

Electrically heated chicken brooders are a boon to the farm housewife, who, traditionally derives her cash income for household staples and luxuries by selling poultry and eggs. Early morning lighting of hen houses during the late fall and winter season—gets industrious layers scratching, exercising, and feeding long before the crack of dawn. It helps combat the otherwise productive lag normally coinciding with long nights and short days.

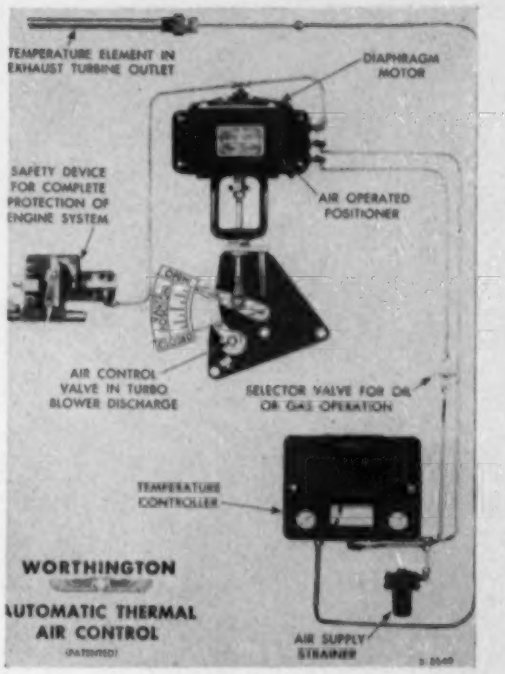
Consumers other than farmers, getting service from the cooperatives are: four grain elevators respectively, located at Orleans, Pisgah, Riggston, and Arnold; two large seed processing plants—one near Arenzville and the other near Deer Plain; a drive-in theater at Summer Hill; a cold storage food locker at Winchester, Illinois; and a number of rural villages with populations from 50 to 500 people. To encourage new members in the expansion of household conveniences, an electric range campaign was started early last summer. Any new member who bought a stove prior to July 1—and who had not used stove service prior to that date—got 1200 kilowatt hours of free service. From July 1 to September 1, anyone buying a stove from a local dealer registered at the Cooperative's July 22nd annual meeting, received 600 kilowatt hours of free service.

Keeping economical plant capacity apace with the rapid expansion of this cooperative is a problem that has constantly faced Mr. Faris and Mr. Collins. Winchester, as previously stated, went on the line in 1938 with three 400 kw. units and a peak of 45 kw. In less than ten years, peaks were heading toward a point dictating the addition of bigger units. During 1947, two 1000 kw. Busch-Sulzer supercharged, four-cycle diesel-electric units were installed and placed in service. This addition brought Winchester's peak capacity up to 3200-kw.—2.66 times the original. Long before completion of expansion at Winchester, plans were under way for establishing another plant near the load center, west of the Illinois River.

Studies showed Pittsfield, Illinois, to be the ideal location. Accordingly, plans were completed and executed for building this new power plant the most modern of its type. All necessary steps to make it an actuality led to its completion and placing in service December 7, 1949. Generating units selected were three 1160 kw. Worthington type SEHGO-8, 16x20, 360 rpm., four-cycle, supercharged diesels, suitable for future conversion to gas operation as dual fuel diesels. Being economy minded, the cooperative selected the best size and type of engine for their particular load conditions, and one that could operate on low cost gas fuel when made available from a nearby gas transmission line.

Gas from the pipeline finally became available this year. By the first of September, all legal requirements were cleared with the Illinois Public Service Commission for the transmission company to supply gas fuel requirements. No time was lost by the cooperative in piping gas to the Pittsfield plant. It was there, ready to fuel the engines by the first of October. By the end of October, the first engine had been converted to dual fuel and had started operating on gas. All engines will be converted and on gas by the end of the year. This conversion will reduce cost of fuel per kilowatt hour at least 50%. Engines in their two plants provide the flexibility needed to economically carry all loads with widely separated peaks in the neighborhood of 1500 and 5200 kw. Off peaks of 1500 kw. normally occur from midnight to 4:00 a.m. High peaks vary with the seasons. During this past year, for example, the summer peak of 5200 kw. hit around noon time. During fall and mid-winter, peaks of this magnitude came around 8:00 p.m.

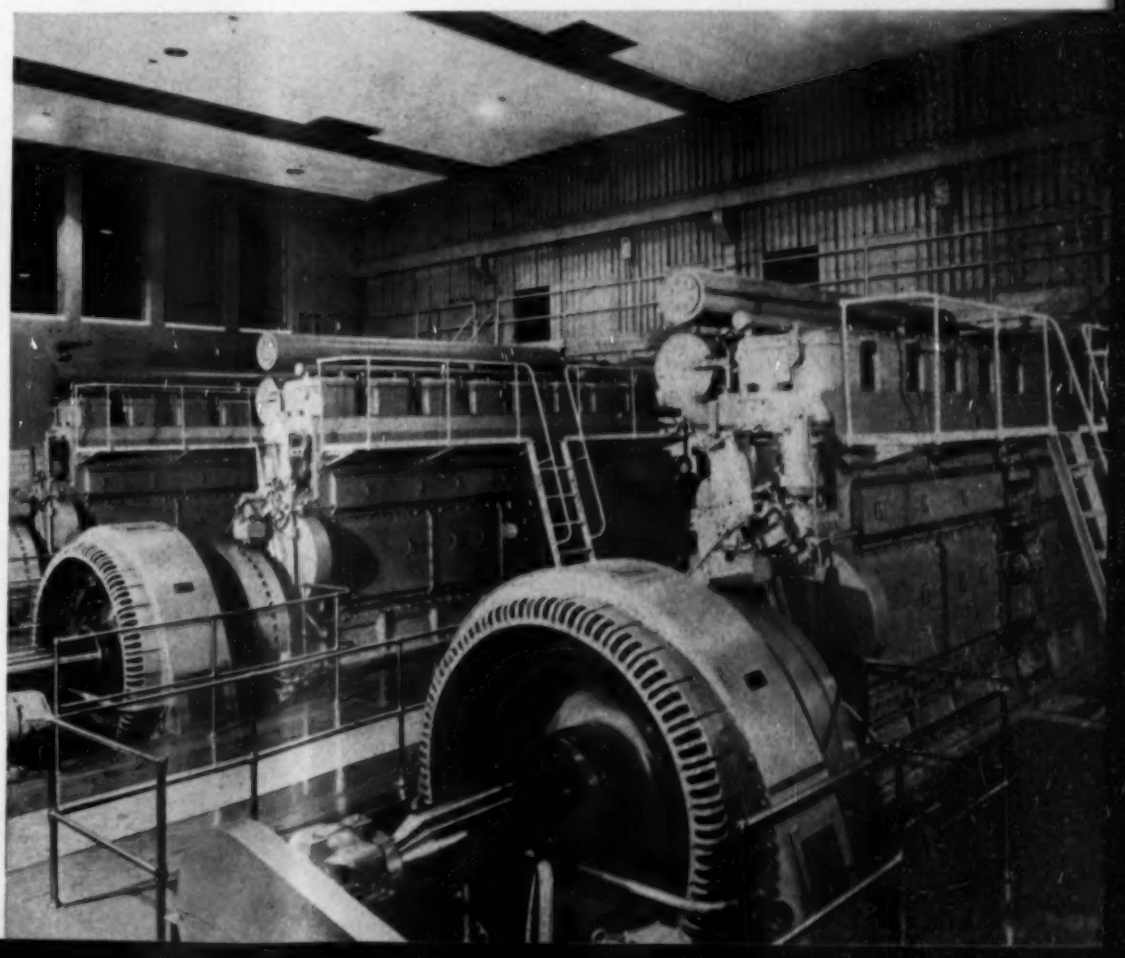
Although the expansion of this cooperative's distribution system is just about completed, its load concentration continues to build up. Almost daily, farmers are finding new uses for electrical, labor-saving equipment to beat labor shortages. Then, too, along with the march of progress, they are finding scientific applications providing additional returns on their substantial investment in farmland, machinery, and livestock. Electrical energy—24 hours a day—when and where consumers need it. This has been the cooperative's goal and accomplishment under competent management.



List of Equipment

Engines—Three Worthington SEHGO-8, supercharged dual-fuel engines.
Generators—Elliott.
Switchboard and Switchgear—ITE.
Lube Oil Strainer—Duplex.
Lube Oil Filter—Hilco.
Lube Oil Cooler—Struthers Wells.
Lube Oil Reclaimer—Hilco.
Fuel Oil Transfer Pump—Worthington.
Raw and Fresh Water Pumps—Worthington.
Heat Exchanger—Struthers Wells.
Cooling Tower—Marley.
Exhaust Silencer—Maxim.
Intake Silencer—Air Maze.
Exhaust Pyrometer—Alnor.
Governor—Woodward.
Intake Air Filters—Dollinger "Staynew."

The three Worthington SEHGO-8 dual-fuel engines as installed in the town of Pittsfield, Illinois.

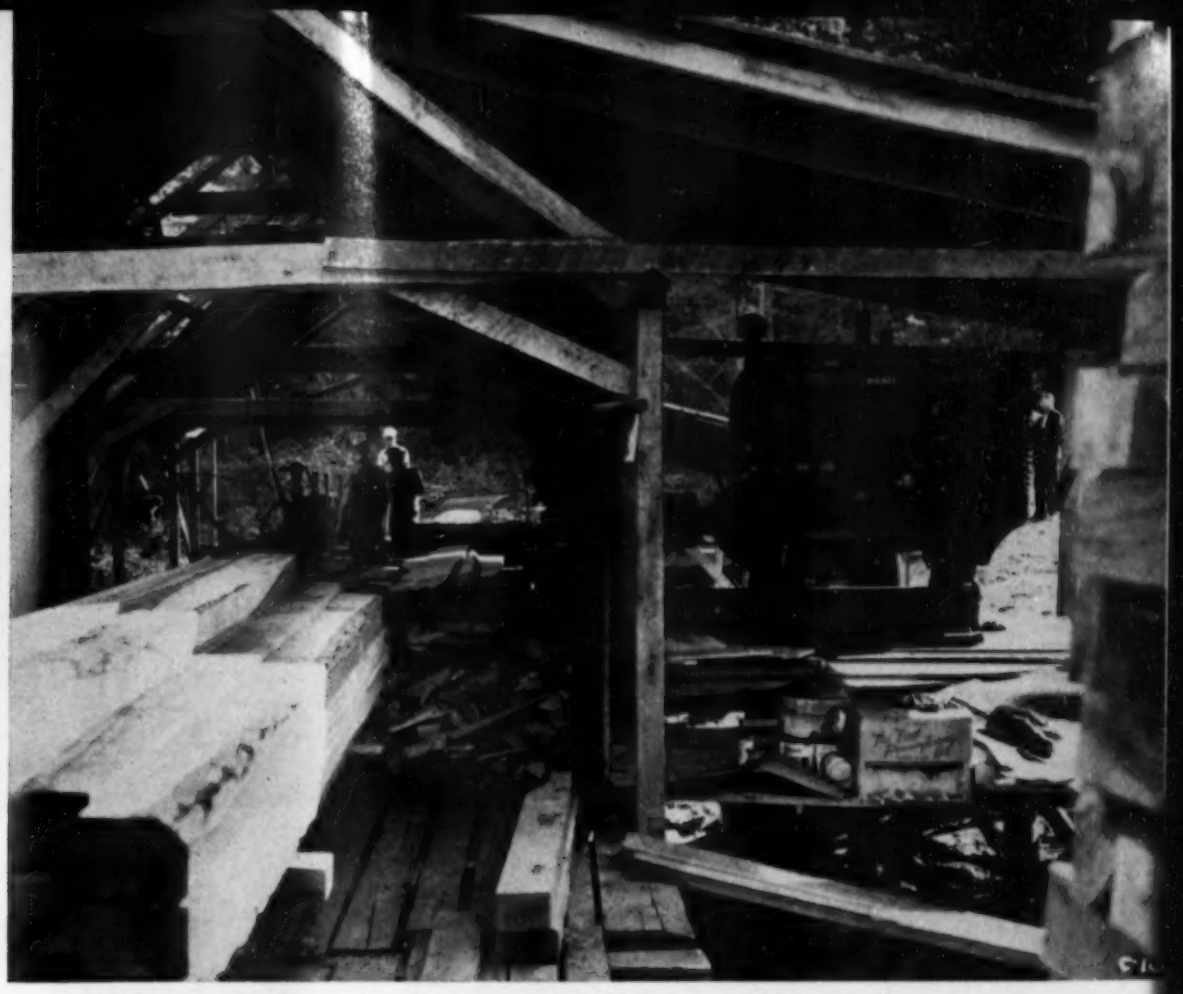


Always plenty to do for William A. Johonnigmeier of Appleton City, Missouri. From August until March he uses his International TD-14A crawler to strip overburden from a coal mine he owns with Jim Wolfe. The rest of the year, he uses the tractor to build stock ponds, clear land or do other custom work.

Swamp for steaks is the switch on formerly worthless 800 acres of everglade owned by G. A. Lovall, Al Ranch, Pahokee, Florida. An International UD-9 pumps rainwater and seepage from this newly created pasture where Brahma cattle will be grazed.

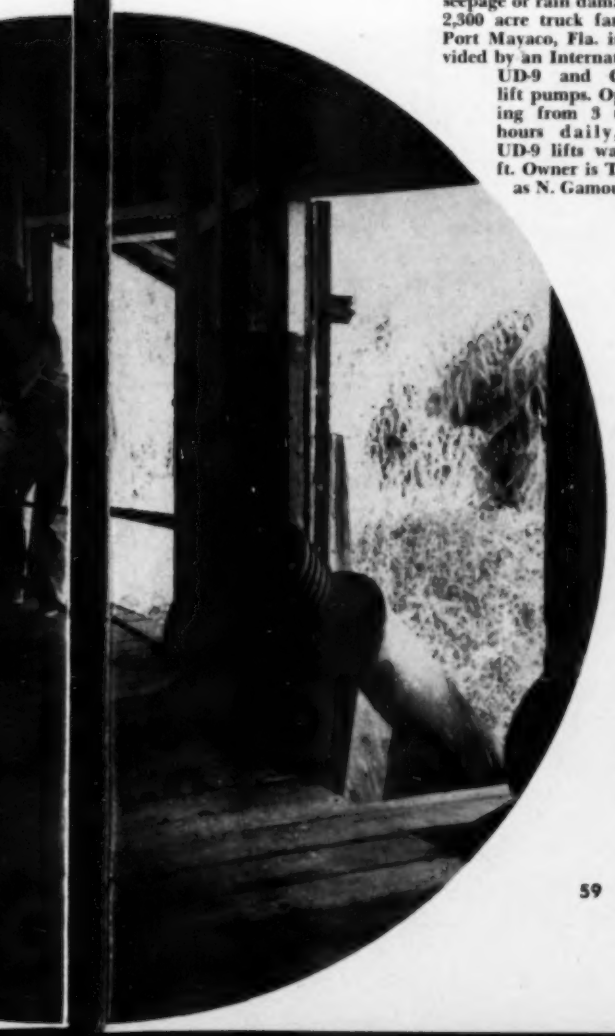
THE UBIQUITOUS DIESEL...ALWAYS THERE...

A compact, profitable operation is this portable sawmill producing 16,000 ft. of boardfeet of pine daily for owner Oneal Boatwright, Mayo, Fla. The International UD-18A diesel powers a 48-in. saw, saw cartridge, edger, sawdust chain and conveyor. The rig can be moved, set up and ready to run in 3 hours.



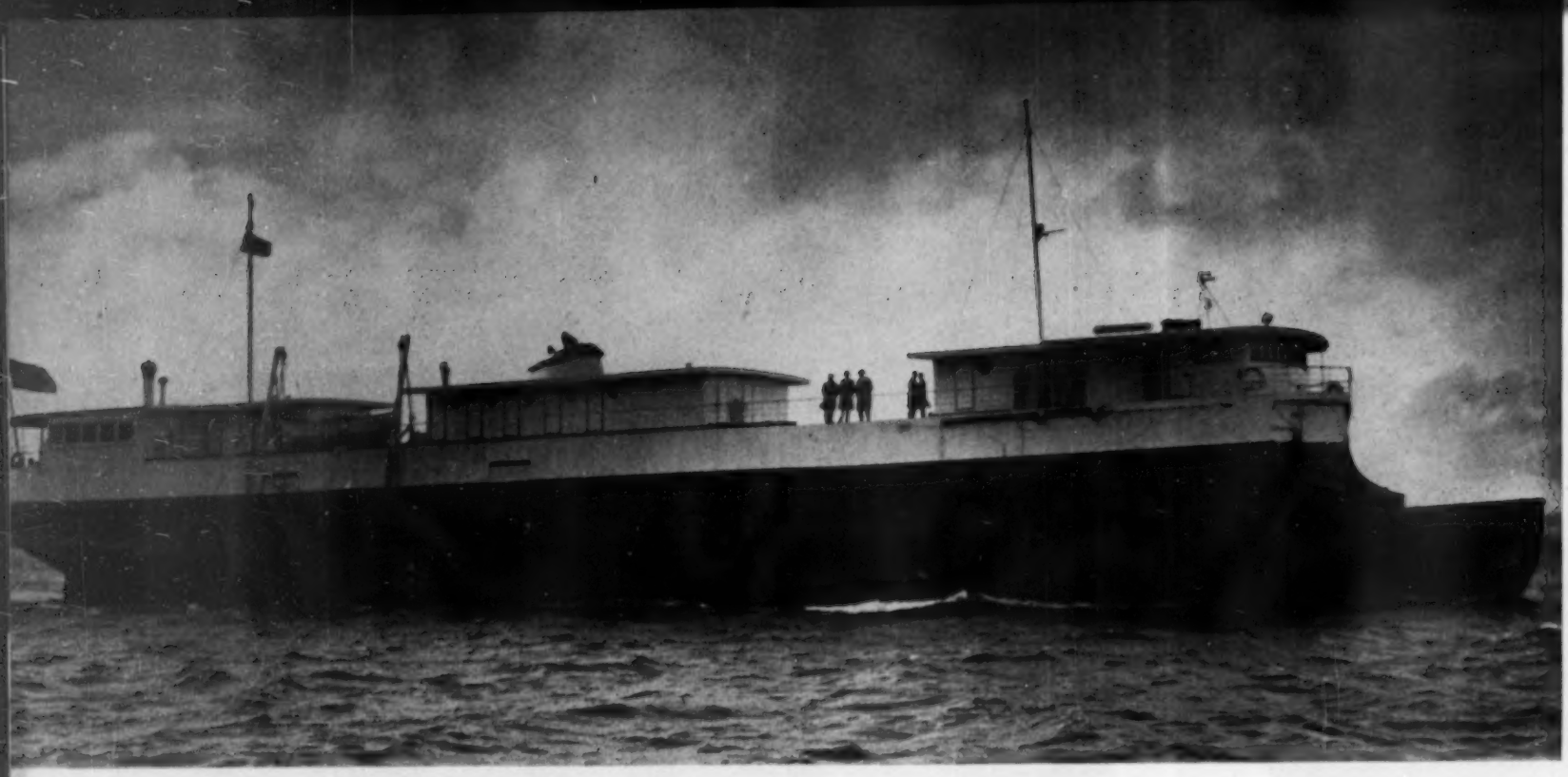
5,000 feet of lumber, most of it destined for use in local coal mines, is the daily output of the C. H. Sinsel sawmill, Independence, West Virginia. The plant is powered by an International UD-14A diesel engine which operates a 60 inch saw, two-saw edger, a cut-off saw and a 200 ft. sawdust chain.

WHEREVER ECONOMICAL POWER IS NEEDED



Protection against flood, seepage or rain damage to 2,500 acre truck farm at Port Mayaco, Fla. is provided by an International UD-9 and Couch lift pumps. Operating from 3 to 24 hours daily, the UD-9 lifts water 9 ft. Owner is Thomas N. Gamount.

Shoving aside the spoil pile is the job of this International TD-24 crawler tractor owned by the Naranja Rock Company, Naranja, Florida, producers of limestone for road construction. When not used as a bulldozer, a rock plow is mounted on the TD-24 to loosen large deposits of limestone in adjacent areas.



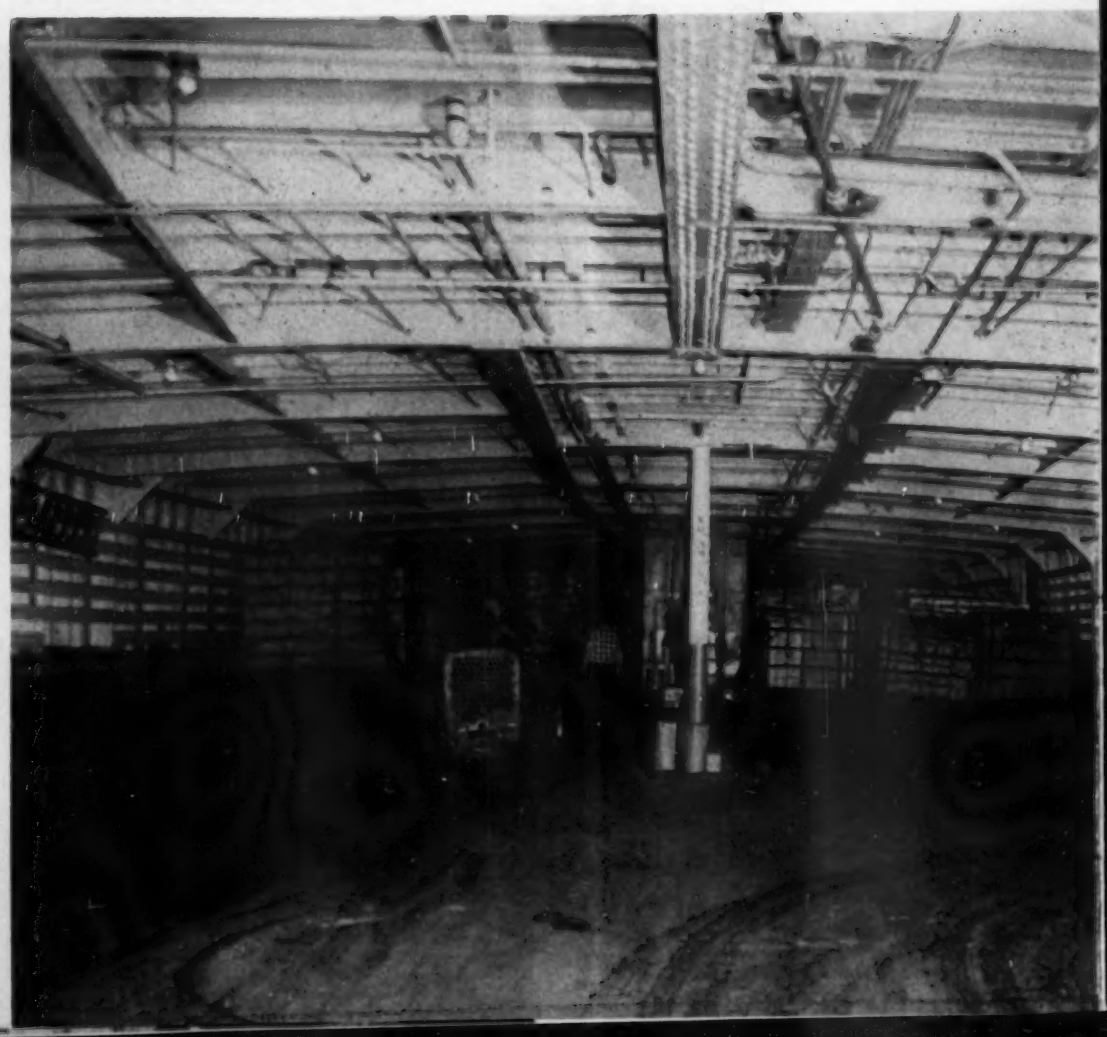
MOTOR VESSEL "IROQUOIS"

By CHAS. F. A. MANN

FEW vessels operating under the American flag have been operating so long or have had such an astounding career as the *Iroquois*, long a popular passenger, mail, automobile and freight ferry on the Seattle-Victoria B.C.-Pt. Angeles run.

Relegated to the boneyard in 1947 upon completion of the de luxe, faster and bigger *Chinook*, the *Iroquois* has finished up 1,500,000 miles on the Seattle-Victoria run, in the years between 1925 and 1947, after she returned back to Puget Sound from a 2 year "home visit" to the Great Lakes from whence she came and was converted to an automobile ferry-passenger ship. She originally was built in Toledo, Ohio and came to Puget Sound shortly after 1905 when Puget Sound Navigation Company of Seattle bought her along with the famed *Chippewa* and *Indianapolis*.

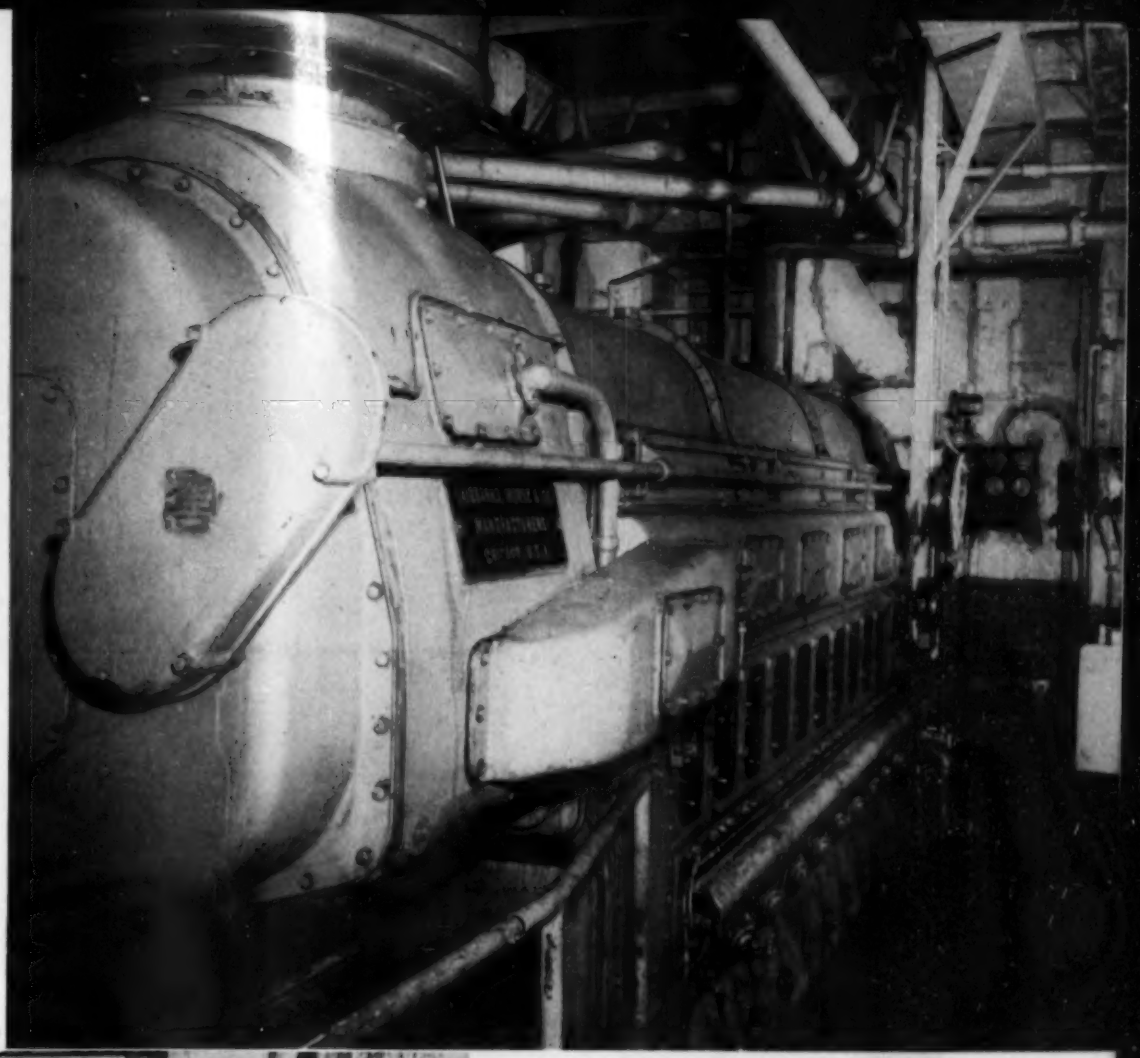
After being redesigned by W. C. Nickum Sons of Seattle and converted to a ferry in 1928 at the old Lake Washington Shipyard, she emerged as a vessel of about 1767 gross tons, with dimensions of 213.8 x 46 x 15.2 ft. overall and retained her original steam power plant which gave her a speed of about 14 knots. After conversion she had sixty-two 2-berth staterooms; four lounges and a capacity for 55 automobiles. The coming of the fast Diesel *Chinook* seemed to spell the final end of the *Iroquois* . . . that is, until the iron laws of economics caught up! Sale of the most of Puget Sound Navi-



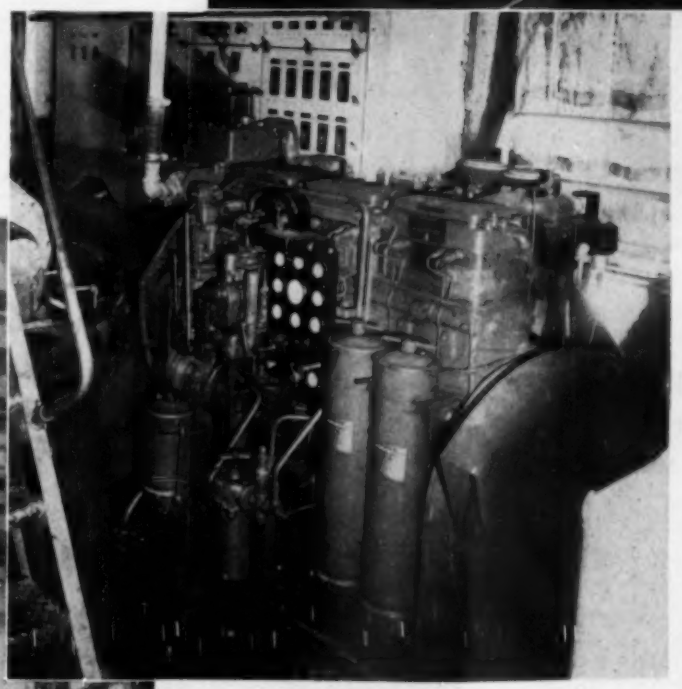
gation Company, except the *Iroquois* and *Chinook*, to the State of Washington, changed the picture.

The decline of ship travel, in favor of auto ferries and airplanes, rolled the economic wheel of fate right back toward the *Iroquois* in the fall of 1952! She was sold to a new company headed by R. J. Acheson and Capt. Alex M. Peabody, known as Black Ball Transport Inc.; towed to the plant of Tacoma Boatbuilding Co. Inc. at Tacoma, and a neat plan of conversion to a modern diesel freight vessel of a type just now coming into its own, undertaken. An almost fantastic reversal of the whole Puget Sound shipping picture pointed the way to the *Chinook* being withdrawn from the Seattle-Victoria service and the all-freighter *Iroquois* being returned to her old job! Nothing like it in the annals of Pacific Coast Maritime history had ever bee nseen before. The *Chinook* was put into the Pt. Angeles-Victoria B.C. service about the same time in late April as the *Iroquois* took up the all-freight run from Seattle to Pt. Angeles. Freight is loaded onto large rubber tired flat-bed trucks and that portion of mail and freight destined through to Victoria is quickly transferred from one ship to another on the Pt. Angeles dock.

Conversion was neatly and economically accomplished by removal of her old steam power plant and the installation of a 10-cylinder Fairbanks-Morse diesel on the old engine foundations. Former boilers and tanks are left in place, sealed up and kept for ballast, since the new 1600 hp. diesel is much lighter than the old heavy triple expansion steam plant. All the upper decks were removed down to the main deck, leaving the former observation lounge in front as the new, very wide pilot house; the center grouping of 8 inside staterooms became outside staterooms for the crew and the after lounge became the galley and the quarters for the stewards department. All the rest of the deck is left open and the stacks cut down to a streamlined nubbin in the center. The freight deck was widened to handle 47 trailers, 20 and 12 ft. length, and the former closed bow was cut back to directly below the line of the pilot house.



The main proulsion unit of the repowered *Iroquois:* a 1600 hp. Fairbanks-Morse opposed piston diesel.

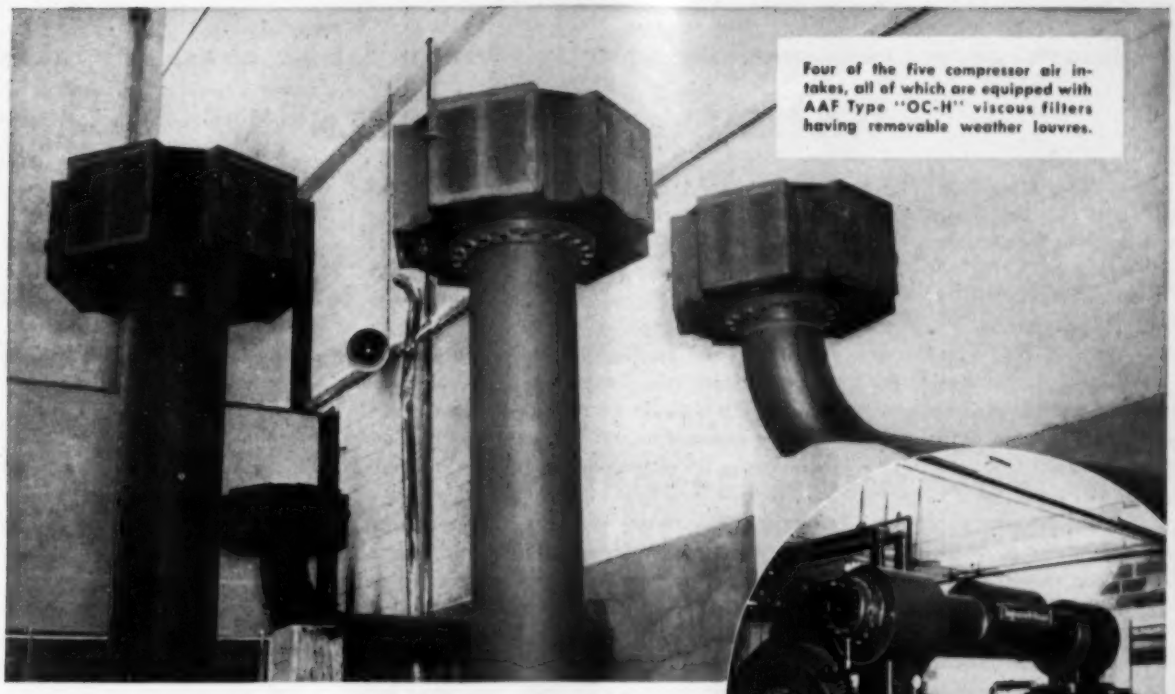


One of the two 165 hp. Cummins auxiliary diesels on the *Iroquois*.

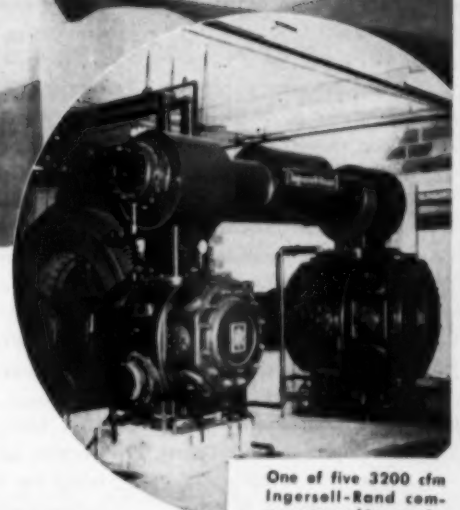
The spacious and clear freight deck of the *Iroquois*.

Auxiliary power is provided by a pair of Cummins 165 hp. 6 cylinder Model H.S. diesels,, each diesel driving an 80 kw. ac. generator and a 40 kw. dc. generator, to handle the modified old electric system. A Sperry steering gear was fitted and a residence type American Standard heating boiler. She will carry about 400 tons of pay load—generally high-value express freight and mail northbound, and return with newsprint from Pt. Angeles. She will operate at approximately 14 knots with her new Fairbanks-Morse power. So, for the third time —fourth if you count the 2-year sojourn back on the Great Lakes, the *Iroquois* starts a new life.

With only 16 crew members needed as a freighter, and a fast, store-door delivery schedule of freight possible with her truck-trailer system of loading and unloading, she promises to be a profitable, useful ship for her new owners and another in the long line of "Firsts" initiated by Capt. Peabody, in his long career on Puget Sound.



Four of the five compressor air intakes, all of which are equipped with AAF Type "OC-H" viscous filters having removable weather louvres.



One of five 3200 cfm Ingersoll-Rand compressors making up the compressed-air system.

FILTERS PROTECT

TANK PLANT against air raids from dust

AAF "OC-H" Filters Stand Guard Over Compressed-Air System Serving More Than 2000 Tools

Compressed air is a mighty important commodity at Cadillac's Cleveland Tank Plant. Five 3200 cfm Ingersoll-Rand compressors provide the motive power for over 2000 air-tools and hoists used in producing the famous Walker Bulldog light tanks.

What havoc dust and dirt could play, here, if allowed free access to this vital system! But they're "stopped cold" at the air intake of each compressor by an AAF Type "OC-H" Filter. Selection of this viscous impingement type filter was based on several factors—ease of installation and maintenance, high cleaning efficiency with low resistance to air flow, large dust holding capacity and rugged construction.

Every engine and compressor user should make "clean air" a defense project—and AAF Filters his first line of defense against dust. There's a unit of a type and size designed to deliver clean air to your exact needs and specifications. Write today for complete catalog information.

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Supervising & Operating Engineers Section

CONDUCTED BY **CHAS. B. GRAVES**

WARMING UP DIESELS

CARELESSNESS in warming up large and small diesel engines can do more damage in a short time than several years of running under normal load. Here are some practical hints on how to avoid such troubles, lengthen the life of the engine and reduce maintenance, operating and repair costs. For years a mass of material has been written and a lot more said about the proper routine in starting and warming up a diesel engine. In most cases they have failed to tell how to do the job properly, or why it has to be done.

In most cases the question of lubrication enters the picture, but even this part of the problem is not properly explained. It is only vaguely discussed in a manner which dodges the direct point of inquiry. The point to be brought out in this discussion has to do with the expansion of metals and how this involves the proper procedure in starting and warming up of any diesel engine.

One of the greatest mistakes and the roughest way to operate any diesel engine is to start the engine in the morning, or any other time, and apply the load in a few minutes. No consideration is given to the tremendous stresses set up in the metal parts of the engine by this practice. Why is this a matter of vital concern in the proper operation of a diesel engine? To begin with, if any heavy duty stationary or marine diesel engine is started and brought up to high speed, without first giving it time to warm up evenly, the lubricating oil throughout the engine is not properly distributed. Furthermore, the engine cooling water does not have time to warm up to somewhere near its normal operating temperature of 160° to 170°F.

Liners, cylinder heads, pistons, crankshafts, and many other parts of diesel engines are made of a thick metal in most cases, because a diesel engine has to operate under high pressures and temperatures to operate economically. Therefore, it takes time for these thick masses to heat through evenly. The cylinder, for example, is heated on the inside surface to the normal operating temperature in a short time; the outside surface in contact with the comparatively cold cooling water will remain near cooling water temperature until the water heats up and the entire mass of metal reaches a stable operating temperature.

When the engine is loaded, the cylinder heads and the top parts of liners and pistons have been expanded by the short run at full load temperature, causing the engine to warp to one side or the other, forcing the pistons out of line with the piston and connecting rod bearings; this in turn causes scoring or scuffing of the cylinder walls and rings. The more heat these parts absorb from the load, the more they will expand, until in many cases the bed plate becomes warm on one side or the other, causing the crankshaft to get out of line. With the bedplate out of line, the bearings will be out of line, causing the shaft to bear unevenly on the bearings. Should the engine be pulling a heavy load, the crankshaft and pistons will cause the bearings to "wipe" a little, the pistons will scratch and scuff the cylinder walls on the thrust side and the rings may be scratched to such an extent that they will soon bypass the compression air into the crankcase.

To the casual observer who has not given this matter serious study it may appear to be a matter of minor concern. However, actual experience and research has proven that these conditions do exist and the engine should be operated accordingly. We all know that engine pistons and bearings will not scuff or score when turning freely even when fully loaded. Uneven expansion when the engine is warmed up in a hurry creates uneven expansion of the different parts—scoring and excessive wear is the result.

Most heavy duty diesel engines can be properly warmed up by two different routines, which will bring the different parts up to normal operating temperature, eliminate excessive expansion strains and retain proper alignment of the entire engine assembly. 1. Allow at least two hours for the warming up period starting the engine at low speed and increasing the speed every half hour. At the end of two hours the engine should be running at three-quarters speed, without load. By this time the engine is ready to take on normal load. 2. By-pass the cooling water from the auxiliary engines through the main engine until the engine temperature comes up to the normal running temperature. This procedure should be followed any time the engine is out of service. If maintained for the life of the engine much trouble and maintenance expense encountered in connection with diesel engines will be eliminated. It will always show up, sooner or later, that when an engine is not given time to warm up slowly and evenly before the load is applied, there will be heavy scoring of the cylinders and pistons. Next, a ring, or rings, will break in the rough spots. What happens afterward is a matter of luck; the engine may come to a stop, or it may crack the piston and even break it up, and severely damage the cylinder. All of this is the cumulative effect of improper starting procedure and insufficient time for warming up the entire engine assembly.

Bearings which are thrown out of alignment temporarily, from unequal expansion of the different engine parts, will overheat and "wipe" the bearing surfaces from the excessive friction and softening of the bearing metal. This will continually get worse as the action is repeated and eventually the entire bearing will be thoroughly wiped, scoring of the journal or crankpin follows, and eventually a complete overhaul of the shaft, bearings and crankpins will be required. These results do not just happen because of faulty lubrication or poor oil, or because the cooling water temperature has been changed. The primary cause is careless starting and insufficent time to warm up the entire engine uniformly before the load is applied. The heavy masses of metal cannot be brought up from normal room temperature to normal operating temperature in a matter of minutes. For large heavy duty engines a couple of hours is not too much.

The real reason for the short warming-up period can often be traced to the management. They look upon the proper warming up period as a waste of fuel, without any visible return. Where this situation exists the engineer has only one way out; circulate the cooling water from the auxiliary engines through the main engine cooling system and keep the main engines hot, day and night, whether they are running or standing still, for the life of the engine.

Most of the older types of diesel engines are piped in such a manner that the cooling water can be shut off from one cylinder while repairs are made on the single cylinder. On such engines the engine can be kept hot even while the engine is shut down for repairs. This is not true for many modern designs of heavy duty stationary, marine or locomotive diesels. The cooling water has to be shut off when any one cylinder has to be opened up for repairs. Consequently, even if these engines can be kept hot by circulating cooling water through them from other engines in normal routine, special care must be used when starting up after repairs have been made, or more trouble may develop in another part. The best results are obtained by keeping the engine hot all the time, whether it is running or shut down. If it has to be cooled off, take plenty of time to get it back to normal operating temperature.

The proof of this statement is demonstrated by the experience of many engineers who have operated engines from eight to ten years without any damage or repairs, outside of the regular maintenance routine. They have kept their engines hot all the time, or, if they have cooled off to normal ambient temperature, they have taken plenty of time to get the engines up to normal operating temperature before the load was applied.

Ask any steam turbine engineer how long it takes to warm up his turbine before the load is applied. Usually, it takes from few hours to half a day, de-

pending on the type of the turbine. They are even turned over for some time by a motor to insure uniform expansion of the whole unit, before sufficient steam is admitted to keep it revolving. If this is not done unequal expansion may damage the blading or distort the spindle and bearings sufficiently to require major repairs.

Most diesel engines have more moving parts than any turbine and expansion of the many different parts varies widely while the unit is started and brought up to normal operating temperature. It takes time for the heat to soak through many of the heavy masses of metal. The only sensible procedure is to take sufficient time to do this gradually, from a cold start, or better still, keep them hot, as far as possible all the time, whether they are running or shut down.

Due to the fact that the principle of all diesel engines is the heat of the compression ignites the fuel, therefore the heat of expansion of metals applies to the high speed diesel engines in the same way as to the heavy duty stationary, marine and steam turbines. Therefore diesel truck drivers and operators, bulldozer operators, shovels and generator sets should take at least a half hour's time in the mornings and let their diesels run idle until they come up to normal operating temperatures, before applying the load for the day. In this case they would find that their repair bills would not come so often and they would be spending more time running on the job instead of down time. But we find that many operators say that they cannot burn fuel for nothing if the engine is not working on the job. Well, in that case they ask for it.

This writer who is a private consulting diesel engineer for several contractors and truck operators, finds that those who maintain a schedule of warming up their trucks and other equipment for half an hour or better in the mornings are able now to reduce their repair personnel to half or better, and 75% less down time on the job and highways.

Organizes Company

Frank E. Ross, Jr.

Frank E. Ross, Jr. has organized The Ross Company in St. Louis, Missouri to carry on a railway supply business. Prior of reganizing his own business, Mr. Ross was a sales engineer for the locomotive division of Fairbanks-Morse and, subsequently, a partner of the St. Louis Railway Supply Company. The Ross Company represents the Farr Company and is now in the process of completing a filter cleaning service shop to clean impingement type air filters.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition was ready to mail June 15. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

INSPIRED DIESEL EQUIPMENT

Inspiration Consolidated Copper Company Changed to Open-Pit in 1948: "Couldn't Be Done Without Diesels"—Asst. Gen. Mgr. Weed

By F. HAL HIGGINS

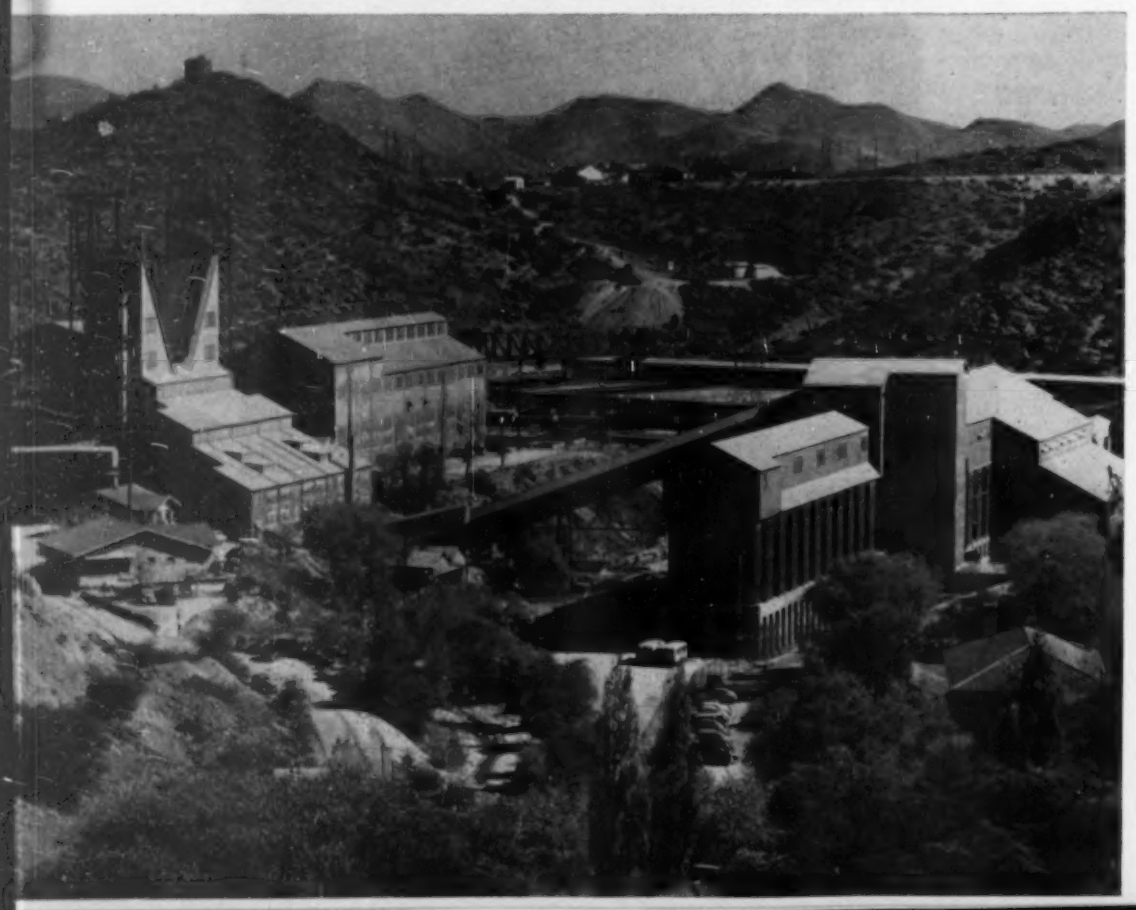
"IT just couldn't be done without diesel equipment." So summed up the interview the writer was invited to by assistant general manager H. C. Weed in his office at Inspiration Consolidated Copper Company's office at their mine at Miami, Arizona. Gathered with Mr. Weed were his two top men who know their equipment and methods, mine superintendent J. A. Watts and general pit foreman Tom Bilson. Garage foreman C. R. Zache was also in on the 3-hour coverage of the open-pit tour and interviews.

Let's have a look at the diesels at this important copper mine that is one of the big factors in producing the essential metals to insure the U. S. independence of the outside world in war and peace: 1 P & H shovel with General Motors diesel engine; 11 Caterpillars—1 blade grader, 1 DW10, 7 D8s, 2 Gardner-Denver compressors with Cat 315 engine; 6 Buda diesel engines in Dart trucks; 6 Cummins diesel engines in Dart trucks; 5 Hercules diesel engines in Dart trucks; 1 sprinkler truck with GMC diesel engine; 1 Cooper-Bessemer diesel in railroad locomotive; 1 GMC diesel railroad switch engine.

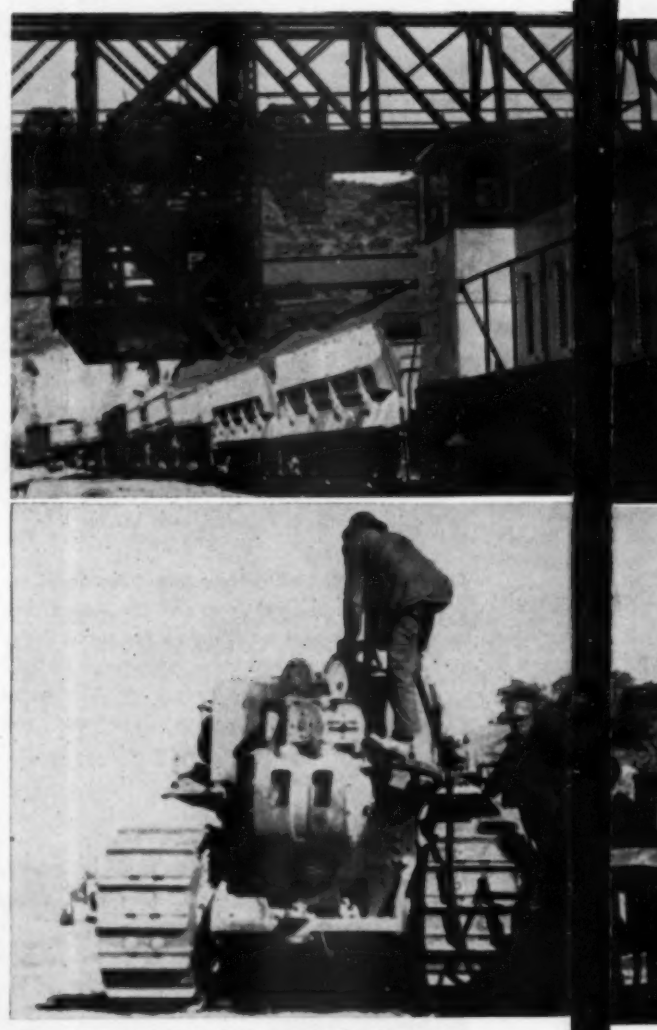
The Inspiration management is proud of its shop and parts room that goes with every mine shop for servicing the heavy diesel equipment. Mr. Weed and his assistants stress the importance of the good roads maintained by their diesel blade grader and admit they are lucky to have the kind of material to make and keep the roads smooth and fast for the rugged heavy hauling traffic that travels over them at high speeds. Their five year figures showing a doubling of the hours betwen overhaul of trucks from 2,500 to 5,000 hours proves they are doing a job in training operators and mechanics to handle their big investment in this equipment. "We have changed to bigger and better engines in the last five years with the big improvement in diesel engines," said Weed. We wanted to carry 25-ton loads up to 8 miles per hour and tried the 240 hp. Hercules. Now the factories have kicked their power up to 350 hp. There is a lot of competition among the engine builders and you see three different makes out there in those trucks operating in our hands and against time and payloads. No matter how good any engine looks on its factory testing grounds, the field service on such jobs as this are the final answer. That uncovers bugs no one could find in the comparatively easy tests of the proving grounds in the hands of friendly operators," observed the pit foreman. "We wouldn't have such good engines, equipment and production if it wasn't for such keen competition with each and every manufacturer and his dealers on their toes to keep their products in the race for the business," added Mr. Weed. "Let's keep it that way and the whole nation will continue to go ahead."

The tire battle here, as in all Alizona strip mines seen by the writer is red hot and wide open. "We

View of the main shaft of the Inspiration Copper Company of Inspiration, Arizona.

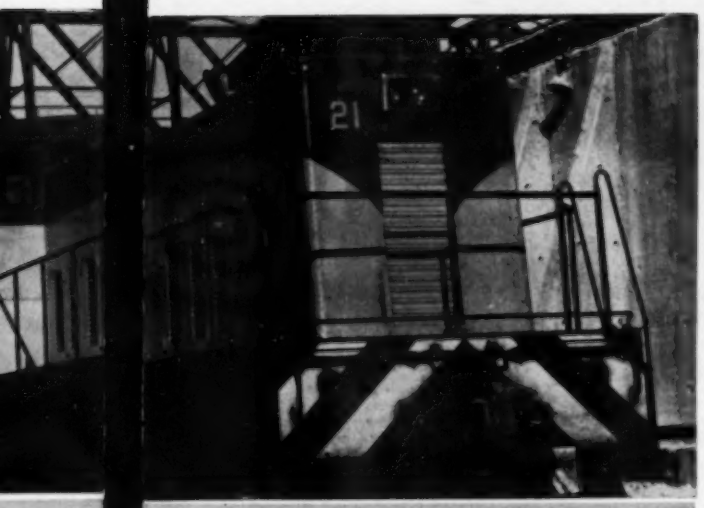


Assistant general manager's two top lieutenants: Tom Bilson, general pit foreman; and J. R. Watts, mine superintendent, as they leave to show your DIESEL PROGRESS correspondent the pit operations and equipment.

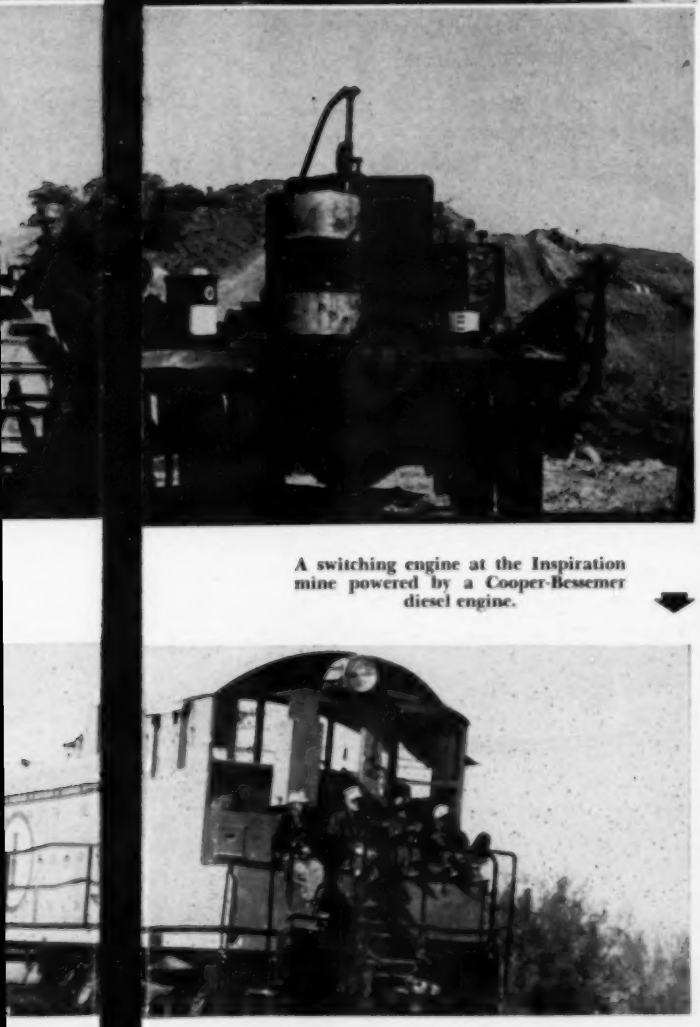


Texaco fuels and greases the Inspiration operation. Here, a fleet of Cats is serviced before removing the top of a hill for the big Hercules, Buda and GM diesel trucks to haul the ore.

The General Motors dieselized locomotive as it arrived at the leaching plant with its load of ore for processing.



A switching engine at the Inspiration mine powered by a Cooper-Bessemer diesel engine.



get 20,000 miles per tire no where it was but 15,000 not long ago," said the foreman. "It was up to 23,000 miles per tire at one time. Firestone, Goodyear, Goodrich, Seiberling and U. S. are all in the running here with Seiberling being used more than any other at this time." Parts stocking of all items needed on trucks is highly important, and the books at Inspiration showed $80,000 in truck parts, another $90,000 parts for shovels, $25,000 in tires, plus tractor, grader and other parts to add up ot a stock inventory of over a quarter million dollars invested in parts to enable the shop mechanic to keep them operating at top capacity.

Asked about the place of the torque converters, which was stressed as essential to heavy duty trucking on strip mining at other mines visited, Inspiration agreed. All their hauling trucks are Twin-Disc converters equipped. "They allow us to increase the pay load, give governor speed continuously to eliminate lugging, and cut the wear and tear on rear ends." The visitor here mentioned noting the big piles of oil and grease drums at handy central spots at each mine for servicing all the high sped diesel equipment used in strip mining. Like the big mechanized farming system of California cotton, rice and other crops, it must be that strip mining operations "literally float on oil," he suggested as an opener to get one phase of the machine drama of today usually forgotten by the men who buy it and take it for granted because of the smooth and businesslike service that keeps them supplied without worry ever since the oil industry fought and won the high speed diesel war of the sticky rings, scored cylinders and failed bearings nearly two decades ago.

"Texaco supplies our grease and oils at this time, but we are getting our diesel fuel from New Mexico. You are right about this mine using a lot of oil field products. Here's the figures: 427,700 gallons of diesel fuel were used in the trucks last year, or 2,000 gallons per day; and it took 48,000 quarts of lubricating oils. The Caterpillars took 87,750 gallons of diesel fuel for the seven D8s, plus another 8,000 gallons for the DW10, and another 4,500 gallons for the blade grader."

Mr. Weed is a member of a famous mining family. His brother, Clyde E. Weed, is a vice-president in charge of operation for the Anaconda Copper Mining Company. He looked over the statement of the Arizona State Department of Mineral Resources handed the writer when he visited that staff a few weeks earlier. He checked the 1951 figures given by that Department and stated that the overall production was the same and that in adopting the open-pit method in 1948, it was a change in mining methods made possible by modern machinery. "An open-pit development and construction program was completed in 1948," said Director Manning of the Department. "Since that time almost half of the ore mined has come from the open pit. In 1949, all necessary work underground was completed for leaching in place certain mined-out and caved areas in the mine to recover part of the remaining copper. Production from this source began in 1950. By January 1, 1952, the Inspiration mine had produced 130,000,000 tons of ore, from which had been recovered 2,500,000,000 pounds of copper worth about $400,000,000."

Development of the Inspiration ore-bodies began in 1909, and about $15,000,000 had been spent before production of copper in 1915. That little item of history gives an inkling of the slow and costly development of mines in the old underground days when it took wars to get Governments to inspire men with capital by lifting prices of copper to make it an attractive investment for money, brains, time and labor. The mass production achieved today with big fast trucks working from open pits has gathered so much momentum that the location, development and mining of most of our essential minerals seems assured. Certainly they can be got out in more inaccessible areas and from lower grade ores tha never dreamed before, and the trend is still toward bigger and better diesel equipment.

Competition is wide open and rugged. Left, a Buda- and right, a Hercules-powered truck under the big P & H electric shovel as they load copper ore. Come back in 12 minutes and a Cummins will be there with one of the rivals.

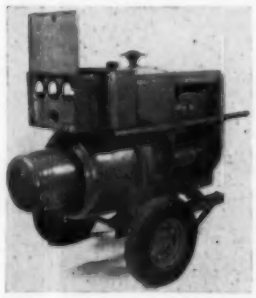
Florida Shrimp Trawler

The *Gulf Lady's* GM Model 110.

Another shrimp trawler for the waters of the Gulf of Mexico; the *Gulf Lady* is the last word in steel shrimp trawlers, built by the Bellinger Shipbuilding Co. of Atlantic Beach, Florida. A 65x18 Tams designed, owned by Land and Williams of Fernandina Beach and powered with a 110 General Motors 275 hp. diesel. Other specifications of this fine craft are 4.5:1 GM hydraulic gear with a Rockford power take-off. The auxiliary power plant is a 1500 watt Delco generator with a Hallett diesel.

Equipped with all the latest conveniences and safety devices, she is now operating in the Gulf of Mexico. Engine room equipment was supplied by the Florida Diesel Engine Sales, General Motors Corp. of Jacksonville.

New Portable Generator



A new model has been added to the lighting plants sold by Katolight Corporation. Illustrated is the new versatile model which consists of a 5 kw. ac. generator producing 60 cycle current at 110/220 volts, single or three phase 220/440 volts at 1800 rpm. The generator is of the revolving field type with separate exciter attached. It is available with or without automatic voltage regulator. Inherent regulation of approximately 8 to 10% is provided while operating on 100% power factor cycle load, that is, lamp load.

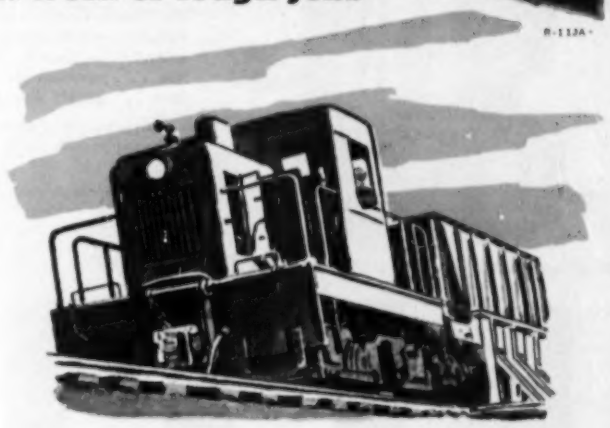
The generator is powered by a 2-cylinder, 4-cycle type air-cooled engine. It is available with or without standard 6-volt automatic type starting. The entire unit is mounted on wheels with retractable handles. Engine and generator are sufficiently housed for outdoor operation. The mobility of the unit makes it suitable for a wide variety of uses and it takes only a few minutes to connect the output terminals to load wires. Bulletin No. S.E.P. 10-50 describing the unit is available by writing the company at 624 No. Front St., Mankato, Minn.

are engineered to make light work of tough jobs

Ask any one of thousands of power users! He'll tell you that Cummins Diesels are standouts wherever they work . . . that they lead the pack with more work done at lower cost, with superb performance in roughest going.

With a rugged lightweight, high-speed (60-600 h.p.) Cummins Diesel, your fuel costs are lower than with any other engine in general use today. This is true because of the economy in fuel injection and metering provided by Cummins' exclusive fuel system . . . because of the inherent savings made possible by four cycle diesel design.

Maintenance costs are slashed, too. Extra care in engineering, manufacture and testing adds thousands of hours of trouble-free operation . . . keeps "down time" at a minimum. Contact your Cummins dealer. He's a diesel power specialist—ready to show you how to apply Cummins savings to your jobs.



CUMMINS ENGINE COMPANY, INC., Columbus, Indiana

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CUMMINS

***Leaders* in rugged, lightweight, high-speed diesel power!**

Bay Area Diesel News

By **Bruce Wadman**

SAN FRANCISCO, June 15: For service at Folsom Dam, two 100 kw. generator sets have been supplied by Oswald Machine Works. The sets are made up of an Electric Machinery generator driven by a Murphy 165 hp. Model 21 diesel engine. These generator sets will be used by Merritt-Chapman-Scott and Savin Construction Companies in their aggregates plant at Folsom Dam.

• • •

THE City of Albuquerque has purchased a 135 kw. diesel generator set for service in its sewage treatment plant. The Columbia generator will be driven by an Enterprise Model GSM-6 spark ignition engine. This engine will utilize sewage gas for fuel and is rated at 200 hp. at 720 rpm. At sea level, the engine develops 235 hp., but this installation will be located at an altitude of 5000 ft., which accounts for the lower horsepower rating.

A NEW GM marine and industrial engine dealership has been established at Stockton under the name of Equipment Sales and Service Co. Allen McCasland is the manager, Durward Spencer is the sales engineer, and Chet Bolay is the shop foreman. These men were all formerly with West Coast Engine and Equipment Co. and have been moved down to Stockton to start this new dealership.

• • •

AN HD-20 Allis-Chalmers tractor, equipped with a Garwood Semi-U dozer, has been supplied to Henry J. Kaiser's sand plant at Felton by Buran Equipment Co. The tractor is driven by a GM 175 hp. diesel engine. A TS-300 Allis-Chalmers motor scraper, powered by a Buda 280 hp. diesel engine, has been supplied to McCamon-Wunderlick Construction Co. for use on a section of freeway on Highway 50 between Tracy and Mountainhouse.

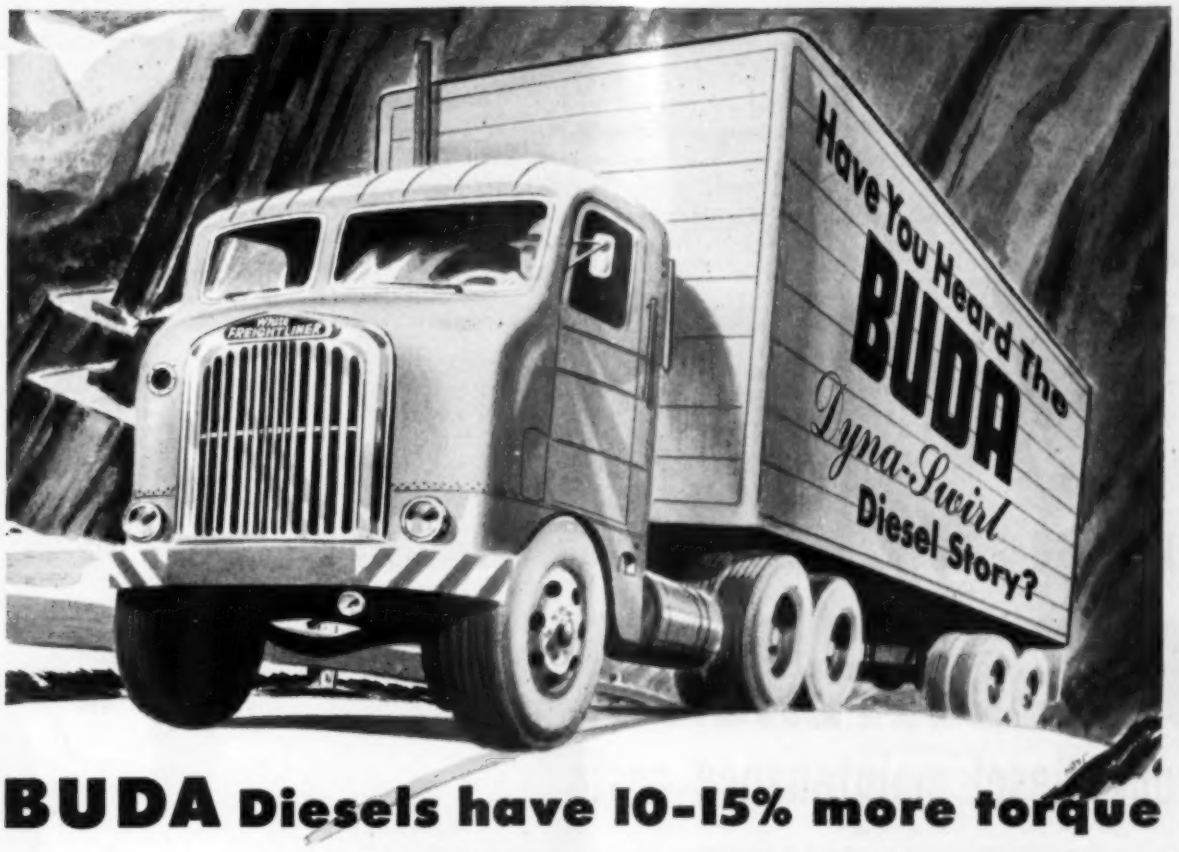
A BUDA 215 hp. Model 6-DA-844 diesel engine has been installed in an I-H oil tanker truck for Union Oil Co. This truck will be used in the Monterey area.

• • •

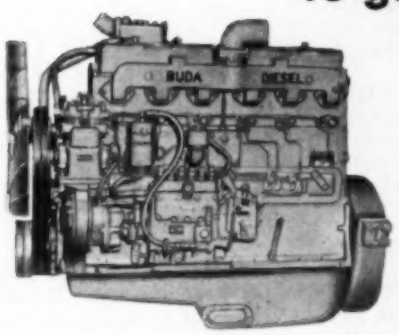
FOR POWERING the 45 ft. long fishboat *Pat LaRocca*, Fairbanks-Morse has supplied a 60 hp. Model 49 diesel engine, which drives the vessel through a Twin-Disc 2:1 reduction gear. This fishboat operates out of Eureka and San Francisco for the LaRocca Fisheries.

Comparison Operating Data—Certain REA-Financed Internal Combustion Generating Plants
March 1953

Plant No.	Size kw.	Gross Generation M KWH	Sta. Ser. %	Plant Factor %	R P C Factor %	Fuel-Cost Oil ¢/gal.	Fuel-Cost Gas ¢/MCF	BTU per KWH	HP/Hrs. per Gal. Lube	Man-hrs. Labor Oper.	Man-hrs. Labor Maint.	Maint. Mat. $	Production Costs Mills/Net KWH Labor	Fuel	Others	Total	BEST OF THE MONTH BTU/KWH
12.	4,320	1,936.0	2.3	60.2	79.5	11.57	14.99	9532	9128	1073	287	254.43	1.47	2.17	.46	4.10	9532
17B.	3,939	1,168.0	3.4	39.8	62.7	9.55	.....	9759	14.423	1070	10	3.46	1.72	6.99	.58	9.29	9759
18.	3,475	942.8	4.6	36.4	83.4	9.25	.....	9643	4155	825	164	692.28	2.09	6.73	1.61	10.43	9643
19C.	10,065	2,781.6	3.2	37.1	65.6	9.73	47.55	9194	2579	1098	445	9.35	1.13	4.84	.58	6.55	9194
25.	9,404	2,976.0	4.1	42.5	90.1	10.31	24.08	9523	5040	1921	751	443.34	1.39	2.76	.53	4.68	9523

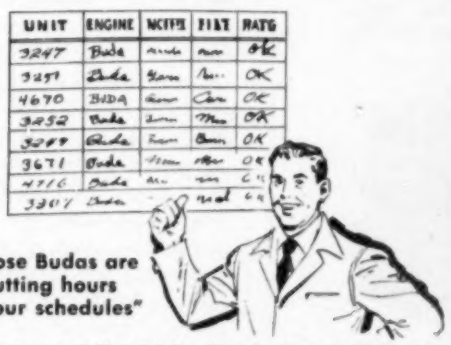


BUDA Diesels have 10-15% more torque to give more carry on the hills...faster schedules



You get faster, more consistent schedules from Buda Dyna-Swirl Diesel powered units because Buda Diesels have more power at the crankshaft...10-15% more torque for greater lugging ability and faster time on the hills.

Coupled with minimum maintenance, increased fuel economy and an average of 160,000 to 200,000 miles before overhaul, Buda Diesels' high torque adds up to more profitable operation per ton mile. See your nearby Buda Engine Distributor today. Ask him for all the facts. Write for Bulletins and data. The Buda Company, Harvey, Illinois.



"Those Budas are cutting hours off our schedules"

BUDA Dyna Swirl DIESEL

a power-full and dependable name in engines

BA-33

Manufacturers of Material Handling Equipment, Lifting Jacks, Maintenance of Way Products, Earth Drills and Diesel and Gasoline Engines

Book Review

High-Speed Diesel Engines, Seventh Edition, by P. M. Heldt. 480 pages, 5½ by 8½, 280 illustrations, Price, $7.00.

This book on the high-speed type of diesel, which was first published in 1932 and has been translated into French, German, Italian, and Spanish, has now appeared in a seventh, completely revised edition. Although dealing with the subject primarily from the standpoint of the engineer and designer, it also contains a chapter on Operation and Maintenance, and another on Starting, in which latter are described and illustrated the various means and techniques for starting diesel engines particularly in cold weather which have been developed in recent years. A separate chapter is devoted to each of the engine types, viz., Direct-Injection, Precombustion-Chamber, Turbulence-Chamber, Auxiliary-Chamber, and Two-Stroke, and the book also contains chapters on Diesel Fuels, Fuel Injectors, and Injection Pumps and Governors.

Among the new material in this seventh edition may be mentioned tables of crank arrangements and unbalanced forces and couples for both in-line and V-type two-stroke engines with different numbers of cylinders, and a discussion of the effect of atmospheric variables—pressure, temperature, and humidity—on engine output and fuel economy. The related problem of horse power corrections for deviations from standard atmospheric conditions in engine tests is also dealt with. Important additions have been made to the chapter on Supercharging, while that on Railroad Engines contains illustrated descriptions of some new locomotive engines. A chapter on Gas Turbines completes the work.

This book may be obtained by remitting the purchase price to DIESEL PROGRESS, 816 No. La Cienega Blvd., Los Angeles 46, California. Add sales tax if for delivery in California.

Offers New Fan Drive

Schwitzer-Cummins Company has issued a colorful bulletin describing their new Thermatic fan drive. This is a rugged, dependable thermostatically controlled fan drive for heavy duty engines. The unit operates on a simple principle. It has a built in multiple disc clutch, normally engaged by spring pressure, turning the fan with the pulley. When cooling is not required, hydraulic or pneumatic pressure, regulated by a special thermostatic control valve, automatically disengages the fan.

Installation is simple. It is interchangeable with the present constant fan drive making use of the standard fan, pulley and bracket. The fan automatically engages in case of loss of actuating pressure. The actuating force for the fan control can be either engine oil pressure or air pressure from the system. The manufacturer claims fuel savings up to 10 percent, increased horsepower output up to 10 percent when fan is disengaged and engine coolant temperature maintained at best operating range which results in better engine performance and lower maintenance costs.

The Thermatic fan drive is available for a variety of engine models including Cummins, Detroit Diesel, Buda, Caterpillar, Waukesha and Hall-Scott. For copies of the informative bulletin, write Schwitzer-Cummins Company, 1125 Massachusetts Ave., Indianapolis 7, Indiana.

Florida Diesel News

By **Ed Dennis**

IN BROWARD County, three model 110 General Motors diesels hooked up to three Fairbanks-Morse 54-inch vertical water pumps. Pump capacity 180 cfs. at 4.0 static head; for use on the Central and Southern Flood Control Project.

NOTHING BUT praise from the operators and service men on the new Buda tractor used to haul Boeing double decker planes around at Miami International Airport; these planes weigh about 75 tons. Specifications are: a Buda Lanova 6 cyl. diesel, American Bosch fuel injection system, Fram fuel filters and a 12 volt Exide battery.

AT BAKERS Haulover, the *Mucho-K* had 2 General Motors model 6-71 installed to replace 2 gas engines. The installation also included a Flagg V drive, Twin Disc clutches, with a 5 knot speed increase. Capt. Kelly is sure proud of his craft.

TWO model 268 Kermath 84 hp. diesel engines with 1:5 Greyhound reduction gears, Snow Nabstedt clutch, for use in a launch around the Ten Thousand Islands on the west coast; from Miami Marine Engineers.

AT NASSAU, Bahama Islands, we saw the M.V. *William Johnson* with two 425 hp. Cooper-Bessemer diesels, a GM 6-71 Delco generating set and a 50 kw. General Electric set with a Cooper-Bessemer diesel. This freighter maintains a regular schedule to Florida ports.

MR. CHOLLY, a new party fishing boat at New Port Richey had two GM 100 hp. diesels installed along with GM hydraulic controls. It cost approximately $26,000 to build.

ATLAS-IMPERIAL diesel at 280 hp. for the *Nellie-pet,* a dragger fishing boat; a Hathaway winch operates from the main engine off a Twin Disc power take-off.

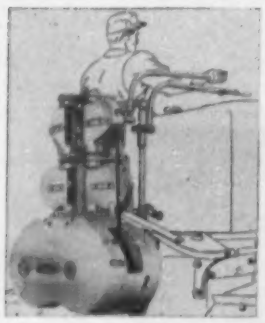
DIESEL BRIEFS: 1800 hp. Fairbanks-Morse for a Blue Stack Towing Co. tug at Tampa; the *Lady Mel* of Fernandina received a GM 6-71 and the *St. John* of Fort Myers also received a General Motors 165 hp. diesel.

FOR HAVANA, Cuba: in the 73 ft. yacht *Willow Dean* owned by Julio Sanchez, a 10 kw. Kohler generating plant powered with a 4 cyl. Waukesha diesel, to be used for air conditioning and refrigeration from J. Frank Knorr, Miami.

AT KEY WEST Power Co. we looked at the latest addition to this modern power plant. A Nordberg diesel with a 2100 kva., General Electric generator. Other accessories were: Fulton Sylphon, Honan Crane oil purifiers, Manzel lubricators and a Woodward governor.

THE *Queen Elizabeth* from Gibbs Corp. of Jacksonville; a package unit shrimper for Jessie Perry of Mayport; powered with a D337 Caterpillar diesel, Snow Nabstedt 4.4:1 reduction gears, Twin Disc power take-off.

Power Control Unit



A new power control unit for rear mounting on Allis-Chalmers HD-15, HD-20 and similar capacity tractors, has been developed by The Baker Manufacturing Company of Springfield, Illinois. This Model PCU-75 control unit combines a multiple disc clutch with a rugged, simplified brake design for high capacity, easy control, simplicity and compactness. Horizontal swing-action hand levers may be adjusted for length, angular position and height for greater convenience. Line speeds reach 710 fpm. with full drum at 1700 rpm. Capacity is 225 feet of ½-inch cable.

GM Dealers

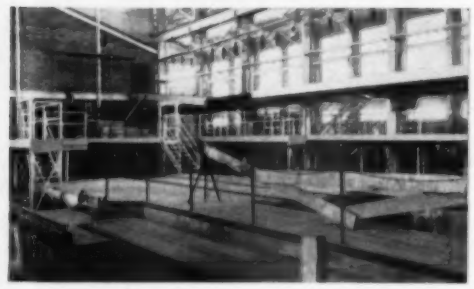
An announcement has been made of special interest to the many firms in New Jersey with construction and industrial equipment powered by General Motors Series 71 diesels. There are now two factory-approved dealers—both in convenient locations in the northern part of the state—offering complete sales, service and parts facilities. This announcement comes from the regional General Motors industrial distributor, Griffin Equipment Corp., 880 E. 141st Street, New York 54, N. Y. The factory-approved dealers, appointed for New Jersey, are: E. H. Kliebenstein Co., Ridgefield, with exclusive selling rights in Bergen, Passaic and Hudson Counties; and Diesel Engineering & Equipment Co., Fords, N. J., with exclusive selling rights in Monmouth and Middlesex Counties. Both organizations offer General Motors diesel engines (30 to 845 hp.) and generator sets (15 to 200 kw.) together with stocks of factory-engineered parts and factory-trained service division. Also offered is the Hallett diesel line in the low horsepower range: diesel engines 5 to 18 hp., generator sets 2½ to 10 kw.

General Manager

John P. DeLaney

Appointment of John P. DeLaney as general manager Transportation Services of American Locomotive Company was announced recently by W. S. Morris, executive vice president. Mr. DeLaney will be in charge of sales of diesel locomotives and renewal parts, factory rebuild service and locomotive field service as well as sales of diesel engines and parts for marine, pipeline and other stationary installations. Mr. Morris said that Gordon P. Link, manager of Renewal Parts, will continue in charge of distribution and sales of locomotive renewal parts and replacement parts for marine and stationary diesel engine customers. He explained that Mr. DeLaney's new post was created "to consolidate locomotive and diesel engine sales and service operations and intensify our efforts to serve the transportation industry."

Diesel Shop for New York Central



Shown above is the interior section of New York Central System's new 48,800-square-foot standardized diesel service and repair shop at Minoa (East Syracuse), N. Y., constructed by Luria Engineering Company from designs developed in conjunction with railroad's engineers. Due to go into partial operation May 1, and into full operation next August, the structure's shop section has two 77-foot clear-span bays, one for servicing, the other for heavy repairs. Former, 243 feet in length, will be served by five-ton traveling crane, while latter, 143 feet long, will have 30-ton crane. Both have elevated, cab-floor height and depressed working levels flanking track pits. Working platforms consist of concrete slabs supported on steel beams and columns.

RUGGED . . . POWERFUL . . . MANEUVERABLE
EASY TO INSTALL and SERVICE
HARBORMASTER OUTBOARD PROPULSION

SPECIAL features not found with ordinary marine power make Harbormaster Outboard Propulsion and Steering Units tops for performance and most practical for tough jobs. Where you want rugged, dependable operation with a minimum of service and maintenance, and where extreme maneuverability and heavy duty power is demanded, Harbormaster is best for the job.

Harbormaster Model 0-41, 40 h.p., gas power shown at left. (Model 0-42, 40 h.p. diesel is similar in appearance.)

Here's why HARBORMASTER is tops

- **Easily installed for immediate use**
  Can readily be installed on most barges, scows, towboats, tugs, derricks, lighters, etc. Is completely assembled and lined up in our plant.
- **Steers instantly in any direction with full power**
  You get the ultimate in maneuverability with the exclusive patented M&T 360° Propeller Thrust Steering Control.
- **Underwater parts easily accessible for maintenance or repair**
  Special 180° elevating mechanism allows one-man operator to raise entire submerged assembly to any degree he desires. No dry docking or diving to make repairs is necessary. Greatest maintenance efficiency of any heavy duty propelling and steering equipment.
- **Opens new shallow water fields to continuous operation**
  Hulls with Outboard Propulsion can be designed for operation in shallow water where inboard powered hulls are impractical. Patented shear pin automatically shears off should underwater assembly strike submerged obstacle. Assembly rides over obstacle, free from damage, without loss of forward motion and operating power! New pin easily replaced while you are under way.
- **Economical to operate**
  You realize big savings in fuel expense because you get more thrust per horsepower with outboard propulsion.

HARBORMASTERS proved in exhaustive use

Hundreds of Harbormasters are now in continuous, heavy duty marine work. Shown below is pusher type boat with 3 Harbormaster Outboard Units used for pushing 200-ton barge loads 25 miles up a shallow river . . . requires only 3 foot draft!

Specifications:
Sizes available from 20 to 300 h.p., gas or diesel power.

Model 0-41 (illustrated)	
Engine H.P.	40
Engine R.P.M.	2300
Fuel tank	16 gallons
Cooling	radiator
Height above deck	47½"
Width	36½"
Weight (dry)	2300 lbs.

Write today for catalog.

Write today for comprehensive catalog on Harbormaster Units. Catalog gives detailed data and valuable information, including over 70 photos and diagrams. Whether you have immediate or future use for Harbormaster Units, send for the catalog so that you will have full information on the advantages of outboard power.

MURRAY & TREGURTHA, Inc., 4 Hancock St., Quincy 71, Mass.

Chief Industrial Engineer

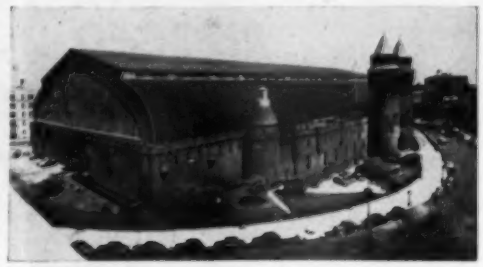
Franz F. Kaiser

Fairbanks, Morse & Co., Chicago manufacturers, recently announced the appointment of Franz F. Kaiser as chief industrial engineer. He will report to the vice president in charge of manufacturing, O. S. Leslie, and his duties pertain to plant layout, plant engineering, tool engineering, processing, work standards, time study, etc. Mr. Kaiser is a graduate mechanical engineer. He joined the Fairbanks, Morse organization after twenty-five years of intensive and successful experience in the field of competitive manufacturing. More recently he was project engineer for the Fairbanks-Morse company's new plant at Kansas City, Kansas, and still later chief layout engineer and chief tool engineer of the Beloit Works, which position he held until his recent promotion.

Wins Fulbright Grant

Dr. P. H. Schweitzer, professor in charge of diesel research, department of engineering research at Pennsylvania State College, has been selected for a Fulbright grant to lecture and study research in diesel engineering in Austria and other European countries during the academic year 1953-54. Besides Austria, he expects to visit Great Britain, France, Germany, Holland, Switzerland, Italy, Denmark, Sweden and Norway.

To House Motor Boat Show



The majestic colossus of Greater New York, the Kingsbridge Armory, Kingsbridge Road and Jerome Avenue, Bronx, which will house the National Motor Boat Show is shown above. The tremendous State-owned structure which has the world's largest unobstructed floor area, 180,000 square feet, will provide more economical and dramatic display for boating industry products. The Golden Jubilee Boat Show, celebrating the 50th anniversary of the National Association of Engine and Boat Manufacturers, will be held in the Armory for nine consecutive days, January 15 through 23, 1954. For the first time the National Show will have first floor space for all exhibitors and be open on Sunday. The exhibition field, equal in size to four football fields, is surrounded by a balcony seating 3,000. There will be two exhibitors' lounges serving drinks and food and a public restaurant and bar seating 500.

Retires

Andrew G. Finigan

Retirement of Andrew G. Finigan, one of the pioneers in the development of the diesel locomotive on American railroads, is announced by N. C. Dezendorf, vice president of General Motors and general manager of Electro-Motive Division. Mr. Finigan, former manager of Electro-Motive's Plant Three in Cleveland, has been on special assignment since last August.

Filter Distributor Appointed

Fleck Engineering Company, Inc. of Baltimore, Md. announces the appointment of Sea-Ro Packing Company, Wood-Ridge, New Jersey, as distributors of the Fleck full line of Filters and Filter Elements in the New York and Philadelphia areas. The Sea-Ro organization will carry a full stock of Filter Replacement Elements for prompt delivery to any part of the territory covered by them. The telephone number of Rea-Ro Packing Company is (New York) Longacre 5-2720.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition was ready to mail June 15. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

Stripping for Coal

Uncovering a vein of coal near Cowansville, Pennsylvania is this Model 3500 Manitowoc shovel owned by the C. H. Snyder Coal Company. It was recently repowered with a General Motors Series 6-110 diesel engine by Highway Equipment Company of Pittsburgh. Working 18 hours a day the shovel is producing 10,000 tons of coal a month.

Book Reviews

Torque Converters or Transmissions, for Use with Combustion Engines in Road and Rail Vehicles, Tractors and Locomotives. By P. M. Heldt, Member Society of Automotive Engineers, formerly Engineering Editor of Automotive Industries. Fourth edition, 476 pages, 5½ by 8½ in., 285 illustrations. Price, $6.00.

It will be noted that the title of this book is "Torque Converters or Transmissions," not "Torque Converters and Transmissions," which latter might seem more appropriate to some readers, in view of the fact that the volume deals with both the conventional type of automotive transmission and the new automatic type comprising a hydro-kinetic torque converter and an assembly of planetary gears with automatic control. It is the author's contention that every type of automotive transmission is a torque converter, and that the term should not be confined to the hydro-kinetic type. If the latter is specifically referred to it should be described as a hydraulic or hydro-kinetic torque converter.

The first part of the book deals with the conventional automotive transmission and with the friction clutch which is an essential complement or accessory of the former. The chapter on Friction Clutches is followed by one on Automatic Clutches, and that in turn by one on Hydraulic and Magnetic Couplings. One chapter is devoted to Principles of Toothed Gearing, and that is followed by one on Sliding-Gear and Constant-Mesh Transmissions. A chapter on Planetary Transmissions forms the connecting link with the latter part of the book, which deals with the numerous types of automatic and continuously variable transmissions that have been developed—electric, hydrostatic (or positive-displacement hydraulic), hydro-kinetic and pneumatic. An interesting type is the differential or power shunt transmission, of which that at one time used on the Owen Magnetic car was a prominent example.

In the latter part of the book the emphasis naturally is on the new type of automatic transmission combining a hydro-kinetic torque converter with a self-changing planetary gear, which is now available on most makes of American passenger cars. The problems presented by this interesting mechanism are dealt with in detail. One of them is to ensure a smooth shift, free from jerks, under all conditions. This led first to the combination of the hydraulic unit (either coupling or converter) with the planetary gear, and more recently to improvements in the hydraulic control which, while permitting of taking up the slack in the clutch or friction band rapidly, permit only a gradual increase in the pressure with which these devices are applied, thereby avoiding shock. Another problem, relating to the overall efficiency of the transmission, has been attacked by making the pressure of the hydraulic control system dependent on the position of the engine throttle, so that when the engine is throttled and therefore incapable of producing high power, the gear pump of the control system works against reduced back pressure and therefore wastes less power.

Hydraulic couplings and hydro-kinetic torque converters are extensively used in connection with diesel engines, not only in buses and other types of motor vehicle, but also in earth movers, power shovels, etc., which brings the subjects dealt with in this volume right into the field of the Diesel engineer.

This book may be obtained by remitting the purchase price to DIESEL PROGRESS, 816 No. La Cienega Blvd., Los Angeles 46, California. Add sales tax if for delivery in California.

Air Conditioning Manual

A newly revised edition of the Trane Air Conditioning Manual has been published by The Trane Company, La Crosse, Wisconsin, manufacturers of heating, air conditioning and heat exchange equipment. A new fan chapter has been added to the book to cover fan application and selection, basic fan laws and duct design data and nomenclature. This chapter adds to the manual complete information on design of air handling systems for air conditioning. The present 380 page edition marks the 16th printing and second major revision since 1938. Since that time the manual has, according to the publisher, not only been popular with engineers and contractors, but has also been used as a standard text and source reference on air conditioning by colleges and other institutions of learning.

The text is illustrated with drawings, photographs, charts and graphs. Problems at the end of each chapter show practical applications; answers are given in a separate section. A reference section contains standard tables on air, refrigerants, pipe capacities for refrigerant liquid and vapor and ducts. The manual can be purchased from The Trane Company, La Grosse, Wisconsin for $5.00. The new Company, La Grosse, Wisconsin.

Worthington Bulletin

A new bulletin entitled "New Developments in Oil Diesel, Dual Fuel Diesel and High Compression Spark Ignition Engines," by Volney M. Holmes, assistant manager, Engine Division, is being offered by Worthington Corporation. The bulletin, known as S-500-B55, describes and illustrates up-to-date features of modern, economical, heavy duty, internal combustion engines. It includes a heat balance chart illustrating waste heat recoverable from exhaust gases and jacket cooling water. Accompanied by fuel cost charts for determining most economical type of engine selection, and reprints describing industrial and municipal installations utilizing heat recovery systems resulting in engine thermal efficiencies of approximately 75%.

Included with Bulletin S-500-B55 are: Bulletin S-500-B54, with fuel cost charts mentioned above; RP-492, Hyperion Sewage Disposal Plant (Los Angeles); and RP-481, "Diesels Make Potash in Utah." For additional information direct requests to Engine Division, Worthington Corporation, Buffalo 5, New York.

Scraper Pads Pipeline

A new kind of rig for padding pipelines, this 275 hp. Euclid scraper has a power driven screw which feeds material out of a chute on the side. It is the idea of Anderson Bros. Corp. of Houston, Texas, who are using it for padding 150 miles of 24 inch pipe being laid in rocky country between Menard and Cedar Valley, Texas, for the Rancho Pipeline Co. Before the rig was put into operation, the padding crew consisted of 35 men and 7 dump trucks. The rig made it possible to cover more footage per day with 15 men and one truck. Anderson is also using two Euclid bottom dumps for backfilling, dumping along side of the ditch and pushing the fill in with dozers. The Euclid scraper was selected because its independently actuated hydraulic ejector makes it possible to feed a steady and closely controlled flow of material to the screw. In constructing the unit, the apron was welded shut, the feed screw installed in front of and above the cutting edge, and the chute extended out the side. The feed screw is chain driven from a gasoline powered engine mounted above it to the top of the scraper bowl. The scraper is top loaded with a front-end loader.

Those Efficient Diesels

Four railroads in Australia, owned and operated by the government and operating over 2,201 miles of track, are beginning to show a profit. The reason? Diesel-electric locomotives. Last year they showed a profit for the first time in seven years. The diesels, of both American and British manufacture, cut costs from $1.70 a locomotive mile to 44 cents. The engines are given full credit for placing the railroads in the black.

Assistant General Sales Manager

Walter F. Schmid

C. B. Schmidt, President of The DeLaval Separator Company has announced the appointment of Walter F. Schmid to the position of Assistant General Sales Manager. Mr. Schmid was formerly manager of the company's Refrigeration Division. In his new position, Mr. Schmid will be closely associated with W. A. McGill, Vice President and General Sales Manager.

Mr. Schmid was born and educated in Michigan, and joined The De Laval Separator Company in 1932 at its Chicago office. He was engaged in De Laval sales management activities at the Chicago office until 1942 when he joined the U. S. Air Force. He served with the 346th Squadron of the 350th Fighter Group, landing at Casablanca at the beginning of the African invasion. His service included the entire Mediterranean campaign and the invasion of Italy.

After his discharge at the end of the war, he returned to The De Laval Separator Company at Chicago. In 1948, Mr. Schmid was transferred to the company's New York office to become manager of the Refrigeration Division.

Huge Tractor Bulldozer

Allis-Chalmers has delivered a new massive tractor bulldozer to the U. S. Corps of Engineers from its Cedar Rapids, Iowa, Works. This four-wheel rubber-tired tractor, designed for operating scraper equipment and as a prime mover, was built for military use under a development contract with the Engineer Research and Development Laboratory, Fort Belvoir, Virginia. Engineering on the vehicle was started in January, 1951, under the direction of H. W. Rockwell, chief engineer; Dale Hawk, project engineer; and Robert Johnson, winterization engineer. Construction of the "Bull Moose," as it is called, was started in March, 1952, and completed in November. Since then it has been undergoing various tests. The vehicle is 11 feet 7½ inches high; 22 feet 9 inches long; and weighs 51,300 pounds with the dozer and cable control unit. The dozer blade itself is 11 feet wide and 4 feet high. The relatively low center of gravity and tremendous size gives the machine unusual stability.

Since speed and maneuverability are essential, the unit has been designed to travel at a top speed of 25 miles an hour pulling a 50,000-pound towed load. The drive mechanism is of the four-wheel type—front and rear wheels on each side are geared together. Maneuverability is achieved through four-wheel hydraulic power steering which permits control of both sets of front and rear wheels simultaneously or independently. Thus all four wheels could be turned simultaneously to the same angle if desired and the unit then would move sideways at that angle. The tractor can also be steered by braking. Power is provided by a 300 hp. Cummins diesel engine. A torque converter and semi-automatic transmission are additional features of the drive mechanism.

Another interesting aspect of the "Bull Moose" is the design problem presented by the temperature requirements. To meet operating conditions of 65 degrees below zero, the tractor has enough heaters underneath the engine hood to heat three five-room houses (in a moderate climate like southern Illinois for example). For operator comfort, a heater is installed inside the cab. It would heat an average four-room house. The engine heaters are designed to enable the tractor to start within an hour in a temperature of 65 degrees below zero. Coolant used in the engine tests to 90 degrees below zero—122 degrees below the freezing point of water. One of the safety features built into the tractor is escape hatches in the top of the cab. If the tractor turned on its side or fell through ice, the operators could crawl out of the cab.

Big 50-Ton "Eucs"

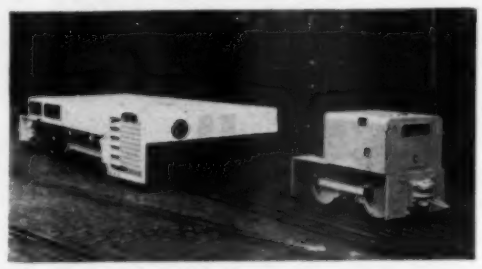
Four 50-ton Euclid Rear Dump trucks, recently delivered to the Utah Construction Co. for use at Geneva Steel Corporation's operations near Cedar City, Utah, bring the number of these big "Eucs" now in service to a total of 42 units.

Thirty are being operated by Western Contracting Co., working on Missouri River dam projects, and six are being used by the Dick Construction Co. in Pennsylvania coal fields. One is on the iron range in Minnesota and another operating at Bagdad Copper, Bagdad, Arizona.

The first of these big twin-powered trucks, driving separate rear axles through Allison torque converters, Allison semi-automatic transmissions, and 300 hp. Cummins diesel engines, was put in service just two years ago. They have proven to be reliable units that stand up in heavy service and handle as easily as smaller "Eucs".

At Fort Randall Dam, where Western is operating two and three shifts, capacity loads are being obtained with three passes of an 11 yard Marion shovel in an average of one minute and the trucks are hauling at speeds up to 35 mph. Starting with 10 units, Western has gradually built its fleet up to 30 trucks.

New Type Mines Diesel



Shown at the Cleveland Mining Congress May 11 to 14 is the world's lowest and most powerful mines diesel locomotive, 37 inches high, 18 feet long, 170 bhp., 37,000 lb weight, and able to haul 700 tons in its bottom gear at 5½ mph. Built by the Hunslet Engine Co. Ltd., Leeds, England, who have 350 diesels underground, this locomotive was designed specifically for U. S. coal mines, and meets the requirements of the Bureau of Mines and answers all the questions of the Mineworkers' Union.

Powered by a Cummins NHHB1-600 flat engine for which wide servicing and spares facilities exist throughout the States, it has a four-speed gearbox giving track speeds of 5½, 7, 9½ and 14 mph. SKF roller bearing boxes and Westinghouse air brakes and sanding are features. The Cummins engine was chosen because of its excellent combustion, which ensures only infinitesimal amounts of carbon monoxide and nitrous oxide in the exhaust. Engine exhaust passes through a conditioner box with venturi attachment and with heat insulated covering and fitted with an automatic audible alarm to warn if exhaust temperature is getting too high. Flametraps are fitted to inlet and exhaust.

Southeast District Manager

Jack E. Cooper

The Diamond Chain Company, Inc. of Indianapolis, Indiana, has announced the appointment of Mr. Jack E. Cooper as Southeast district manager with headquarters in Atlanta, Georgia. His office address is 92 Fourteenth St. N.E., Atlanta, Georgia. Mr. Cooper, prior to his appointment as district manager in Atlanta, served as sales representative in the Chicago office of the Diamond Chain Company.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition was ready to mail June 15. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

New Distributor Named

George W. Codrington

The Detroit Diesel Engine Division of General Motors announces the appointment of the Diesel Engine Sales Corporation as distributors of its GM marine diesel engines in the New York metropolitan area. The new distributor will replace the New York Marine Sales Office formerly maintained by Detroit Diesel at 1775 Broadway, according to E. F. Bentley, Detroit Diesel general sales manager.

Heading the new distributorship as president will be George W. Codrington, formerly general manager of the Cleveland Diesel Engine Division of GM and a pioneer in the application of diesel engines in the marine industry. Among other officials announced are Victor Anderson, executive vice president, Henry Knese, vice president, and W. C. Gould, vice president and general manager.

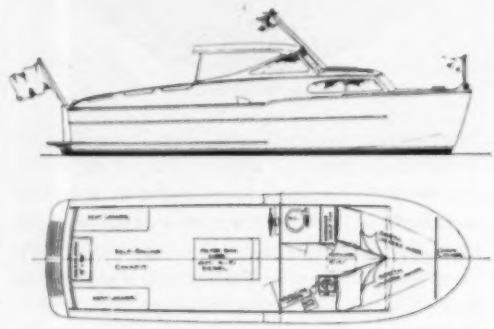
The Henry Knese Marine Sales and Service Company, Inc., of Flushing, New York, a former direct dealer of Detroit Diesel, will be absorbed in the transaction and its facilities on College Point Causeway will be utilized by the new company. Mr. Knese, in addition to serving as a vice president, will also be general manager of the service facility. Former direct sales dealers of the Detroit Diesel Engine Division in the New York metropolitan area will continue as dealers for the new distributor. These include Diesel Engineering & Equipment Co., Fords, New Jersey; General Marine Repair Company, Brooklyn; H. W. Sweet Shipyard & Machine Works, Inc., Greenport, Long Island and West Haven Shipyard, Inc., West Haven, Connecticut.

Flexible Hose Bulletin

A new two-color bulletin on CMH Flexible Metal Hose has been released by Flexonics Corporation, Maywood, Illinois. This bulletin emphasizes the wide range of hose types and assemblies available from this manufacturer, with over fifty years of background in metal hose fabrication. One section pictures some of the more common flexible hose installations, while another includes a handy application chart, showing the type of CMH assembly to use for handling various kinds of liquids, gases, solids, and semi-solids. For a copy write Flexonics Corporation, 1325 South Third Avenue, Maywood, Illinois, designating bulletin CMH-122R.

Diesels Eye A New Market

Is Detroit Diesel's new Model 4-51 suitable for small pleasure craft? Does it have enough power for its weight? Is it quiet enough? Is it smooth enough? Can a small cruiser be designed that will be fast enough for good sporty water skiing? This will require at least 20 miles an hour. Can the 4-51 drive such a boat at a sustained speed of 18 to 20 miles an hour for 2 or 3 hours to reach good salmon trolling waters somewhere on Puget Sound, instead of the customary 8 to 10 miles of the average gas cruiser? Will it troll? Will the price be reasonable? Will it have nearly twice the cruising range on the same fuel tankage? Will it be immeasurably safer?



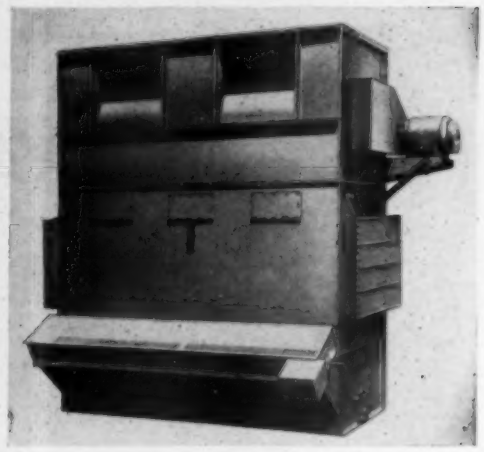
An optimistic yes is the answer of Evans Engine & Equipment Co., Inc., progressive distributors of GM diesels in Seattle, Washington. In fact they have backed their belief with some real money by placing an order for a 24 foot Express Cruiser to be powered with a 4-51. The craft has now been built by Monson Boat Works, on Lake Union, from plans prepared by Mr. Edwin Monk, Naval Architect, of Seattle. Profile drawing and general arrangement are reproduced with this article.

By publication time this pioneer Diesel Express Cruiser will have been in the water and all these questions will be answered. We know our readers will be interested in the outcome and in an early issue we will report full particulars of performance, with actual photos of the "Jimmy D" in action.

Executives Elected

At the recent annual meeting of the stockholders of The Vellumoid Company of Worcester, Massachusetts, the following officers and directors were elected. Richard D. Seamans becomes chairman of the board. He had been president since 1944. Lewis Wald was elected president. Mr. Wald came with the company after graduating from Harvard in 1916. He spent two years as chemist, then becoming assistant superintendent. Since 1940, he has been vice president and general manager. Thomas G. O'Neil becomes vice president. All of his business life since graduating from Harvard, class of '30, has been with The Vellumoid Company, except for his service in the Navy as lieutenant commander in the Pacific. He was appointed general sales manager in 1950. Philip C. Beals continues as treasurer. He has been with the company since graduating from Harvard, class of '42, except for service in World War II as a Marine fighter pilot in the Pacific, with the rank of captain.

Coolers by Young Radiator



The Young Evaporative Cooler.

Three new catalogs have been issued by the Young Radiator Company. They cover the Young evaporative coolers, supercharger air intercoolers and evaporative gas coolers. These coolers are described in detail with full illustrations and diagrammatic drawings.

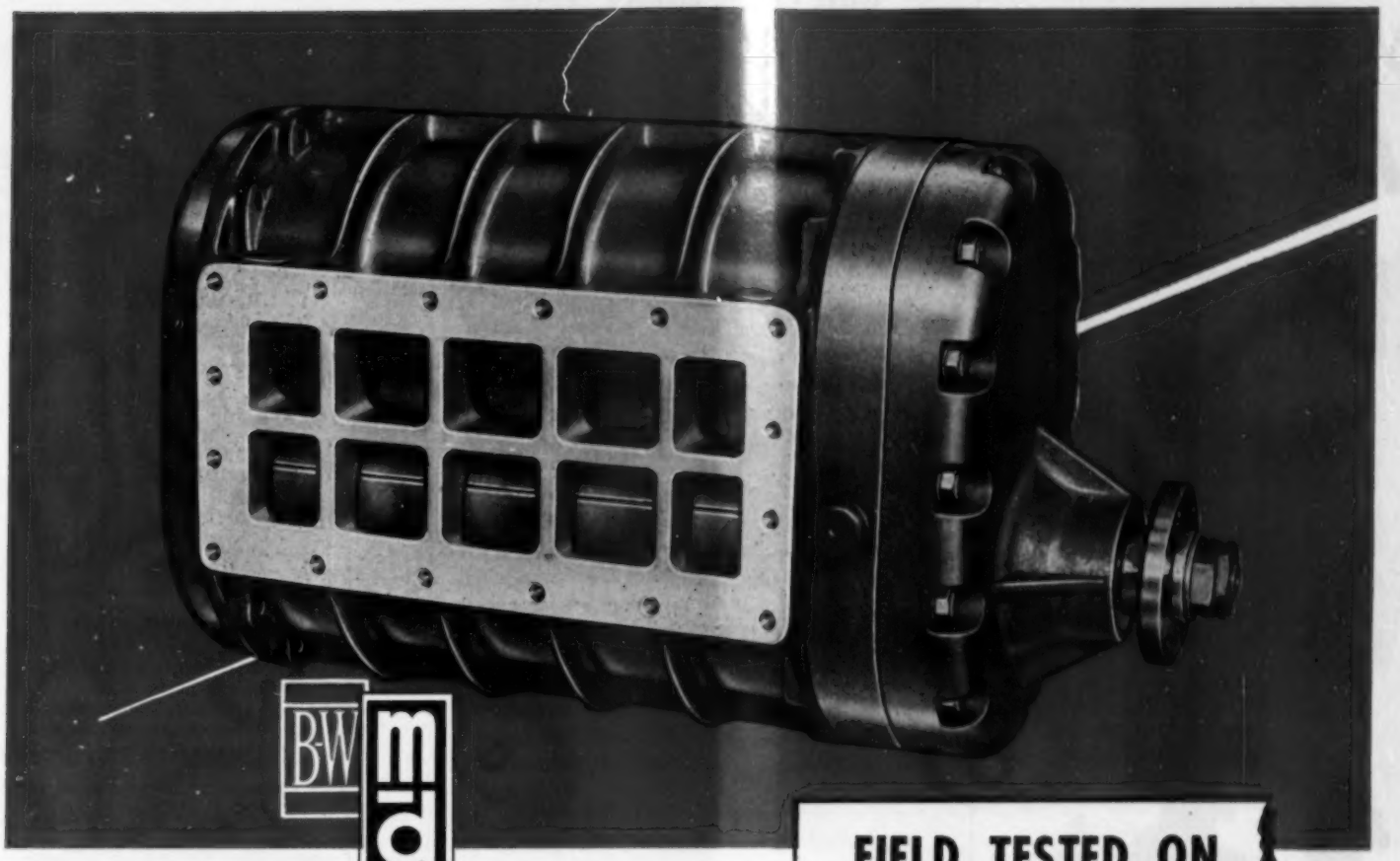
Catalog No. 1952 on the evaporative coolers details applications, gives the capacities and lists the specifications. The Young evaporative cooler is a completely self-contained cooler and is used to cool either a liquid or a gas in the coils by evaporation of water sprayed over the cooling coils. The versatility of the unit is attested to by the fact that engine jacket water, lubricating oil, steam, natural gas or other fluids can be cooled. Steam, hydrocarbons or other fluids can be condensed merely by variations in the basic design. Normal operating pressures of 100 psig. are used for water and oil cooling. For steam and natural gas cooling and condensing, pressures up to 2000 psig. can be handled. Catalog No. 1953 gives further details on the evaporative gas cooler.

The supercharger air intercoolers are described in catalog No. 1652. This type of cooling is applied between the supercharger blower and the engine's combustion chamber. Two types of supercharging systems are in common use with 4-cycle engines, the low pressure and the high pressure systems. Two types of intercoolers for these systems and a scavenging air cooler for 2-cycle engines are described.

Annual Meeting

The Locomotive Maintenance Officers' Association will hold their 1953 annual meeting at the Hotel Sherman in Chicago on September 14 through 15. Great interest in this meeting has been stimulated by the pre-convention meetings which have been held during the past two months in seven different cities. The topics discussed at these pre-convention meetings included diesel electric problems, diesel mechanical problems, shop planning, diesel material reconditioning and control, shop practices and diesel personnel training.

Reports on these and other subjects will be presented at the annual meeting in Chicago. The exchange of ideas and discussion of problems at these annual meetings have resulted in increased operational efficiency of railroad diesel equipment.



A NEW NAME FOR A famous Supercharger

MIEHLE-DEXTER supercharger boosts power, decreases weight-to-horsepower ratio on leading Diesels.

Extra Power to Pull Heavy Loads! Power that means less engine space, less weight per horsepower and more *usable* horsepower. That's supercharging with performance-proved M-D supercharger.

Lab tested for efficiency at Borg-Warner's supercharger laboratory, it's the same supercharger proved for staying power, efficiency and low maintenance service on leading Diesels.

Exclusive Features Improve Performance. The M-D supercharger's exclusive end plate design and tip insert reduce rotor end clearance and improve engine fuel economy. Lightweight 3-lobe rotor cuts vibration and allows high speed safely . . . to improve efficiency.

Specify standard M-D models for your applications from 100 to 750 h.p. Or for special requirements consult your M-D engineer.

For more facts write Miehle-Dexter Supercharger Division, Racine, Wisconsin.

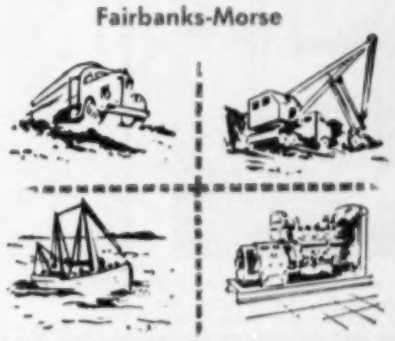
FIELD TESTED ON LEADING DIESELS

The M-D supercharger has won universal acceptance on engines produced by many of the leading Diesel Engine manufacturers, including the following:

Venn Severin Hercules

Buda Cummins Murphy

Fairbanks-Morse



The M-D positive displacement supercharger is now engineered and produced by the Miehle-Dexter Supercharger Division of the Dexter Folder Company. The Division maintains complete servicing and repairs for new superchargers and for the thousands now in operation.

MIEHLE-DEXTER SUPERCHARGER DIVISION

100 FOURTH STREET • RACINE, WISCONSIN

Gulf Coast Diesel News

By **Michael T. Pate**

THE CITY of Liberty, Texas, has just put in service a JS-8 GDT Cooper-Bessemer supercharged gas diesel, rated at 1200 hp. at 450 rpm. The engine drives a 900 kw. generator in the city lighting and power service. This unit is the sixth Cooper-Bessemer engine installed by the City of Liberty in the past 15 years.

SOUTHERN Pine Lumber Company, Diboll, Texas, has purchased through Stewart & Stevenson Services, Houston, a General Motors Series 71 diesel, 4-cylinder, to replace a steam engine on a log loader in the company's East Texas operations.

GEORGE Bacon Towing Service, Houston, Texas, has just put in service the tug *Sherry L.*, built by the Bludworth Shipyard, Houston. The *Sherry L* is powered by a General Motors diesel, Series 671, 6-cylinder, and will be used for general towing service on the Gulf Coast.

BAUER Smith Dredging Company, Port Lavaca, Texas, has bought two International Harvester model UD 24 diesels for installation in a twin screw tug. The dredging company is making the installation.

STEWART & Stevenson Services, Inc., Houston, has sold two single cylinder, 5 hp. Petter diesels to Foley's, Houston department store, for emergency pump service.

ATLANTIC Refining Company, Corpus Christi, is having installed by Platzer Boat Works two Model 451 General Motors diesels, developing approximately 78 hp. each at 2800 rpm., for installation in a crew boat to be used in inland waters of that area.

BETHLEHEM Shipyards, Beaumont, Texas, has purchased from Buda Engine & Equipment Co., Houston, one Model 2BD77 15 hp. Buda diesel to be installed as combination compressor and bilge pump drive in marine service.

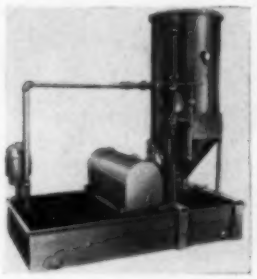
JEFF LaBUFF, Crosby, Texas, has bought from International Harvester, Houston, two TD 24 tractors, dozer equipped, for use on his contract at the Dow Chemical Co. reservoir in Brazoria county, Texas.

SLATER Well Servicing Company, Corpus Christi, Texas, has bought from Stewart & Stevenson Services, Inc., a General Motors Model 8103, twin four, Series 71, to be installed as main drive on one of their oilwell servicing rigs.

DUQUE Seafoods Company, Aransas Pass, Texas, has bought from Buda Engine & Equipment Co., Houston, one Onan diesel equipped with 3 kw. generator, for installation in their fishing vessel, *Miss Aransas*. The unit will be used primarily to maintain the vessel's storage batteries.

BROWN & Root, Inc., Houston, has secured a General Motors twin six, series 71, to provide drive for sand pump on its inland dredge now being reconditioned.

New Coolant Clarifier



Greater filtering capacity plus low operating cost is offered with the new Houdaille "J" Type coolant clarifier, recently developed by Honan-Crane Corporation, Lebanon, Indiana. Compact, multiple filter-tube unit features over 16,000 square inches of filtering area—removes all chips, abrasives, dirt and other solid contaminants from both water based and mineral oil coolants used in individual machine tools or small central systems. Simplicity of design assures dependable, low cost operation and eliminates need for precoating, filter aids, or expendable filtering media. Clarification of coolant is accomplished by passing liquid through multiple filtering tubes suspended vertically within the clarifier. Self-cleaning tubes, washed free of contaminants during backwash period, require no manual cleaning or maintenance—provide maximum filtering efficiency at all times.

New unit can be operated continuously, independent of the machine tool, or intermittently, as desired. Several models available depending on capacities to be handled and individual filtering requirements. By removing contaminants, "J" Type clarifier keeps coolant in a safe, clean condition indefinitely; extends tool and wheel life; provides better product finishes and fewer rejects; increases overall production; and reduces downtime. For complete information write Honan-Crane Corporation, 202 Indianapolis Ave., Lebanon, Indiana.

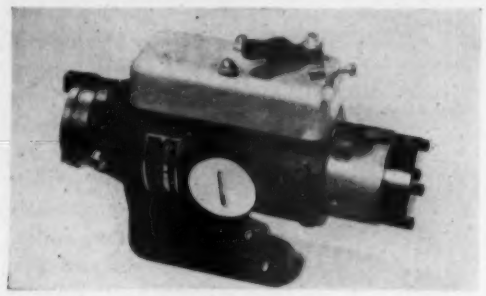
Sludge Control in Diesels

The Magnus Chemical Company has announced a new application for Magnus Metaffin which has been in use for the control of sluge, varnish and gum formation in passenger cars and other gasoline-powered vehicles. It is the application of their product in diesels. A petroleum concern tried it in twenty-eight 800-hp. Clark diesels and found it effective in keeping the rings free. Metaffin was added to the force-feed lubrication oil, not to the upper cylinder. About 10% was required in relation to the volume of oil in the system. Since clean oil is essential to the proper preventive program, new filters of the fuller's earth type were installed at the inception of the new program.

Winslow Bulletins

The Winslow Engineering Company has issued two new bulletins outlining the reasons for fuel and lube oil filtration. The bulletin on lube filtration entitled, The Curious Case of Angus McFrugal, is a delightfully written description of what a lube filter should do. The bulletin on fuel filtration covers crude and residual fuels; diesel, gasoline and other refined fuels; natural gas, sewage gas and other gaseous fuels. The bulletins are available from the company. Write them at 4069 Hollis St., Oakland 8, California.

Licensing Agreement



The Hartford Machine Screw Company of Hartford, Connecticut announces the signing of a licensing agreement with C.A.V., Ltd. of London, England to manufacture and sell the Roosa-Master fuel injection pump abroad. The Roosa pump is a single cylinder, opposed plunger, inlet-metering distributor type pump and was presented to the industry at the annual convention of the Society of Automotive Engineers in Detroit in January.

The pump now being manufactured at the Hartford Machine Screw Works Company is available for four, six or eight cylinder engines and the design lends itself to applications on two and three cylinder engines as well. The pump can use either the existing engine governor or its own built-in centrifugal (mechanical) governor or automotive (hydraulic) governor. It can be mounted by either a flange or bracket which is an integral part of the housing and it can also be mounted vertically where it can be driven by the present distributor drive.

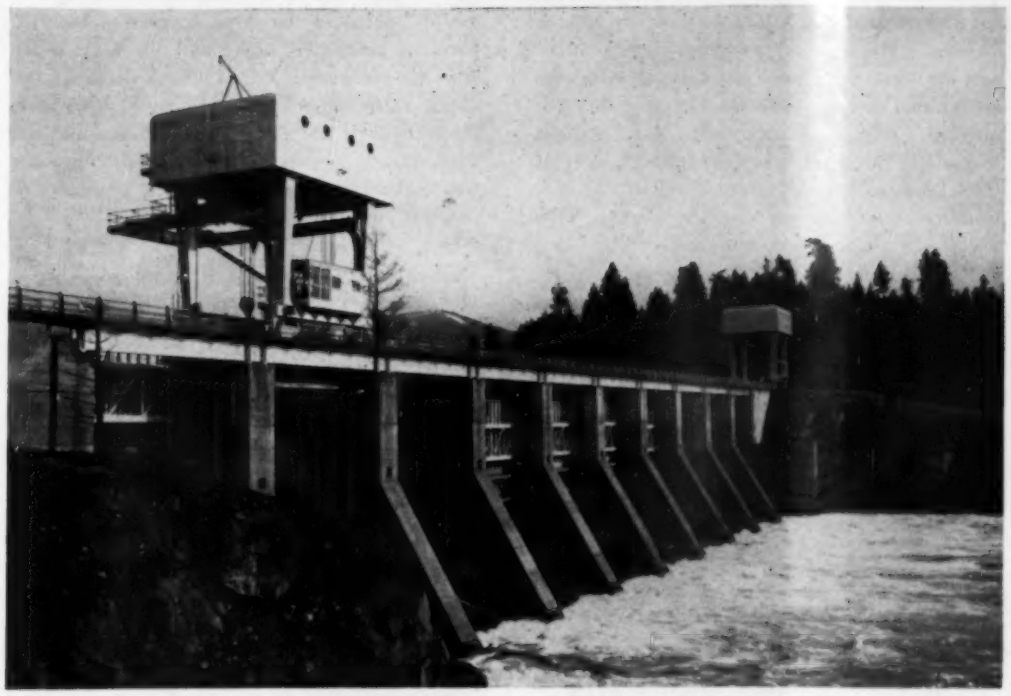
Fodor Sells

At a special conference recently, Kirke W. Connor, president, Micromatic Hone Corporation, Detroit, announced the acquisition by Micromatic of a company producing industrial equipment in the field of high precision. The company, Diesel Engineering and Manufacturing Corp. (Demco) of Chicago, has a backlog of about a year's production. This backlog, Mr. Connor said, reflects immediate additional earning power for Micromatic. New manufacturing facilities to be provided Demco by Micromatic, will permit a major increase in Demco's business. Micromatic, itself, has a current backlog higher than at any other time in its twenty-five year history, practically none of it in defense work.

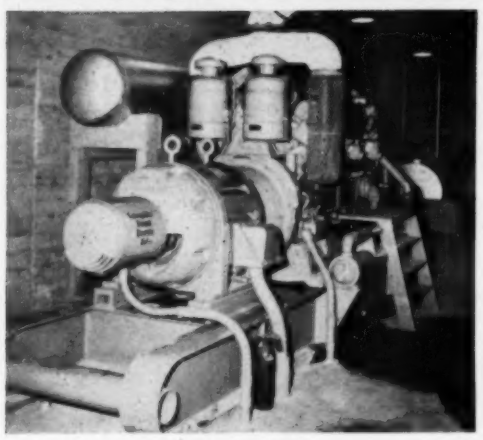
Demco was founded in 1940 by Nicholas Fodor, who has been in diesel engineering work since he graduated from the Royal Technical University of Budapest in 1920. Fodor, naturalized 30 years ago, has worked out techniques for manufacturing diesel fuel-injection systems and jet engine fuel-flow controls that permit mass production of these parts to extreme tolerances—to millionths of an inch. Demco also manufactures tailor-made hydraulic components for jet aircraft. Mr. Fodor headed the Allis-Chalmers department of diesel engineering from 1934 to 1939, before that was a consulting engineer in the diesel field with offices in New York. Last year his company was close to a seven figure gross, turned down more business than it took in due to lack of working capital and manufacturing facilities, and earned proportionately better than Micromatic. Demco will be known futurely as Micro-Precision, Inc., and will be under

ALBENI FALLS DAM

A CIVIL DEFENSE INSTALLATION



The Albeni Falls Dam near Newport, Washington.



The Caterpillar D386 diesel electric set is used as emergency standby to operate spillway gates, etc.

AS an emergency source of power at the newly constructed Albeni Falls Dam near Newport, Wash., a Cat D386 Electric set has been installed in a standby room located inside the structure. The electric set is available to operate the spillway gates and de-icing mechanism in the event of any prolonged interruption of commercial power.

The sale was made by Byrne-Ferris Machinery Co. of Spokane and the installation included fuel storage tank, electric and manual fuel pumps, steel sub-base, heat exchanger cooling and all plumbing and piping. The Albeni Falls Dam is a flood control and power development project on the Pend Oreille River, a tributary of the Columbia and is located in Idaho, two miles upstream and east of the Idaho-Washington boundary. It consists of a gated, concrete-gravity spillway in the south channel, and an intake structure and powerhouse in the right channel. Recently a log chute was put through the shoulder of the dam to handle logs floated down the Pend Oreille.

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the direction of Mr. Fodor as vice-president and general manager. The plant will remain in Chicago.

Mr. Connor said the acquisition of Demco represented the end of a twenty-year search by Micromatic for a straight manufacturing subsidiary that could be integrated readily into a machine tool company. The automatic, high-speed, high-precisioned hone, as developed by Micromatic, is a relative newcomer in the machine tool field and its sales have broadened every year except for a drop immediately after the war. Demco is expected to provide a substantial future growth in fields not normally attractive in the machine tool industry. The deal was effected by a simple exchange of stock —14,428 shares of Micromatic for all of the equity of Demco on the basis of book value. Micromatic has refinanced its bank loan to provide additional working capital and manufacturing facilities for Micro-Precision.

Engineering Bulletin

A new general bulletin just released by The Cooper-Bessemer Corporation of Mount Vernon, Ohio, provides complete data and specifications of Cooper-Bessemer 4-cycle Type LS engines of 15½" bore and 22" stroke. Engines are operated by gas, gas-diesel and diesel, atmospheric or supercharged, and are rated from 690 to 2500 hp. Write the Cooper-Bessemer Corporation and ask for Bulletin L-71.

NEW MODEL THERMOSTAT

PRODUCTION on the new model "C" Amot thermostat has just been begun by American Motors Co., Richmond, Calif. These thermostats are available in pipe sizes of ½ in., ¾ in. and 1 in. The model "C" Amot thermostat was designed with the idea of producing a high quality, dependable thermostat at a relatively low price. These thermostats do not use a bellows, are self-contained with no external tubes or bulbs, and because they are insensitive to pressure, they can be installed right in the lubricating oil lines on engines to control the lubricating oil temperature. Formerly, the only instruments available for such control were relatively high priced valves equipped with external bulbs and lines and with external adjustments. With the Amot, the operating temperature is decided upon, the correct temperature thermostat is ordered, and adjustments are not required, or even possible.

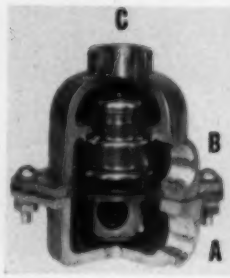


Fig. 1

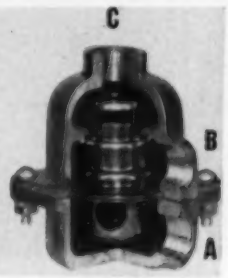
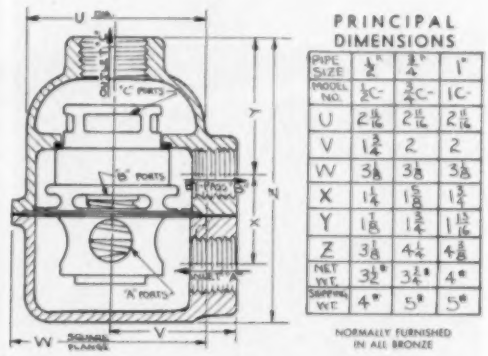


Fig. 2

The largest application for the new model "C" Amot thermostat is in the automatic regulation of jacket water temperature on small marine engines, auxiliary diesel power plants or pumps, and other industrial applications of small diesels such as dieselized air compressors.

The appearance of the new model "C" thermostat is very similar to the old small models, however, the thermostat element itself, which is used to control the temperature, is entirely new. The bellows type element has been eliminated and the new element makes use of the same semi-solid thermostatic material that is used on the large Amot thermostats which are used on large diesel engines. Because a bellows is no longer used, the new element is not sensitive to pressure and will maintain proper temperature conditions regardless of pressures. Everdur is used as a material for the salt water units, which makes these elements ideal for applications in which salt water is run through the engine without the use of a heat exchanger.

In Fig. 1 the element is shown in the thermostat housing in the cold position. The top, or "C" ports are closed, and the by-pass or "B" ports are wide open. In Fig. 2 the element is in the hot position and the top, or "C" ports are wide open, and the by-pass or "B" ports are completely closed. The inlet or "A" ports are always open. Operation can be shown by referring to Fig. 3. When engine is cold, in jacket water applications, the "C" ports are closed. Water from the engine outlet enters the "A" ports and goes up through the element and out the "B" ports and is recirculated in the engine by returning to a tee in the water inlet line on the suction side of the water pump. When the water heats up, the thermal power unit in the Amot element expands and causes the sliding valve in the element to move downward, which starts to open the "C" ports and at the same time starts to close the "B" ports. In the extreme position, the "B" ports are completely closed and all of the water flows out connection "C". In normal operation the sliding valve will reach a stable position between the fully open and fully closed position and the water that is by-passed will be blended into the water inlet line at the external point where the by-pass line joins into the inlet line.



PIPE SIZE	½"	¾"	1"
MODEL NO.	½C-	¾C-	1C-
U	2 11/16	2 11/16	2 11/16
V	1 3/4	2	2
W	3 3/8	3 3/8	3 3/8
X	1 1/4	1 5/8	1 3/4
Y	1 5/8	1 3/4	1 13/16
Z	3 3/8	4 1/4	4 3/8
NET WT.	3½#	3¾#	4#
SHIPPING WT.	4#	5#	5#

Fig. 3

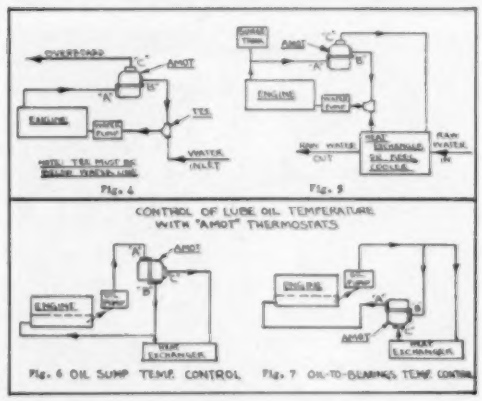


Fig. 4 shows the piping diagram for direct cooled installations for automatic jacket water temperature control and Fig. 5 shows the piping diagram for heat exchanger installations. Figs. 6 and 7 show how the Amot thermostat is installed for lubricating oil temperature control. The installation in Fig. 6 controls the temperature of the lubricating oil in the engine sump. For example, if a 140° thermostat is used, the thermostat will proportion the flow to lines "B" and "C" so as to make the temperature of the oil entering "A" 140°F. and this oil which is entering "A" is the oil which is being pumped out of the sump. In this particular case, the thermostat would hold the sump temperature at 140°F. regardless of load on the engine. At light load the oil temperature going to the engine may be only a couple of degrees lower than the oil leaving the engine because the heat rejection to the oil is low at light loads. Therefore at light loads the oil temperature to the engine may be around 138° F. However, at heavy loads, since the sump temperature remains constant at 140°F. the oil will enter the engine at a lower temperature, 125°F., for example.

If the oil temperature control installation is made in accordance with Fig. 7, then the temperature of the lubricating oil entering the engine would remain constant at 140°F. regardless of load if the 140°F. thermostat were used. Then at light load the temperature of the oil leaving the engine would run only slightly higher, say 142°F. because the heat rejection at light load is small. However, under heavy load conditions, the oil temperature entering the engine would be 140°F., but the temperature of the oil leaving the engine would be much higher, say 155°F. because of the higher heat rejection to the oil at heavier loads.

Occasionally the jacket water installation is made in a manner similar to the diagram in Fig. 7 so as to maintain a uniform temperature of the water going into the engine,. However, this type of installation is the exception rather than the rule. In this case the "Amot" thermostat is being used as a mixing valve in that cold water enters the "C" ports, hot water enters the "B" ports, and the thermostatic power unit moves the sliding valve so as to proportion the water entering "C" and "B" to maintain a desired water temperature emerging from "A".

The fit of the sliding valve is made with excessive clearance so as to eliminate any chance of sticking even under excessive scaling. A seal is accomplished by the use of an "O" ring, which is a Buna "N" synthetic compound. Return springs used in the element are of 18-8 stainless steel. All model "C" Amot thermostats use Naval bronze as a material for the housings. Further information on Amot model "C" thermostats can be obtained by writing to American Motors Co., Richmond, Calif. and requesting a copy of bulletin #131.

Honored

A. M. Buxton

The Gas Appliance Manufacturer's Association has bestowed its meritorious service award upon A. M. Buxton, assistant general sales manager of The Cooper-Bessemer Corporation of Mount Vernon, Ohio. In presenting the award to Mr. Buxton, James F. Donnelly, president of GAMA, Gas Appliance Manufacturer's Association, expressed the appreciation of GAMA's board of directors for Mr. Buxton's noteworthy contributions to the program of the association at its annual meeting at White Sulphur Springs, West Virginia.

Erratum

The Wirkkala Propeller Sales, Inc. advertisement which appeared in the June 1953 issue of DIESEL PROGRESS, page 79, erroneously listed the telephone number of the company as Naselle 271. The correct telephone number is Naselle 541. The company's offices are located in Naselle, Washington.

Cummins Regional Transfers

Wilmot Sandham

The appointment of Wilmot Sandham as Cummins southwestern regional manager, with headquarters at Los Angeles, has been announced by Paul J. Every, manager of regions, Cummins Engine Company, Inc., at Columbus, Indiana. Mr. Sandham replaces A. S. Leonard, who recently resigned the Cummins regional post to take over and operate a Cummins Dealership in New Mexico and three counties of Texas. For the past seven years Mr. Sandham has been an automotive and service engineer for General Petroleum Corporation at Los Angeles. His previous experience also includes work in the east with several distributors of diesel engines. In his new position, Mr. Sandham will represent Cummins in California, Nevada, Arizona and New Mexico. His Los Angeles headquarters are: Cummins Engine Company, Inc., 1101 Equitable Life Building, 411 West Fifth Street, Los Angeles 13, California.

Cummins Rio Grande Sales and Service, Inc., has been organized to handle the former Albuquerque, New Mexico and El Paso, Texas operations of Cummins & Moran, Phoenix, Arizona. Mr. Leonard heads this new dealership as president. J. D. Dennedy is vice president. Headquarters are located at 1921 North Broadway, Albuquerque, with a branch operation at 600 Cole St., El Paso.

Relocates Houston Sales Office

A change of address and a new manager for its Houston, Texas sales office are announced by The Marley Company, manufacturer of cooling towers and water cooling equipment. To give necessary space for the expanding Houston plant, the Marley sales office has been moved from the plant to a separate office at 1601 Commerce Building in downtown Houston, a more central location which will afford closer contact with local customers. Roy W. Maze was appointed manager of this sales office on May 1. Mr. Maze joined The Marley Company in 1946 as advertising manager. In 1950 he was promoted to managership of the Merchandising Sales Department.

Inland River Reports

By David I. Day

MISSING FROM the Mississippi for some time, we got a good look near Greenville, Miss., at the tug *Percheron* of the Kroll interests in Houston, Tex. This tug is starting, as we recall, her 9th summer. She is powered with a General Motors engine.

FARTHER SOUTH than we've happened to see her before was the big 5000-hp. *Allied-Ashland* of the Ashland Oil fleet. She was within sight of the Greenville landing, pushing 15 oil barges with 155,000 barrels. Her General Motors engines in charge of Chief Kenneth Smith were handling the tow with the greatest of ease apparently.

SINCE MINOR repairs at one of the southern yards the busy *Davy Crockett* of the Commercial Petroleum & Transport fleet, Houston, has been doing very fine work in the oil trade. She has a 1700-hp. Enterprise diesel engine in charge of Chief T. A. Dean.

COMING DOWN the Mississippi at Vicksburg was the *Frances K* bound for New Orleans, pushing a dredge from Eddyville, Ky., on the Cumberland River. This boat is owned by E. N. McAlexander in Greenville, and has a pair of Caterpillars totaling 230 hp.

THE LAST time we saw the *Chilli Simpson* she was emerging from the Great Kanawha into the upper Ohio. On our southern journey we noted her above New Orleans with a tow of iron ore and alcohol, said to be headed for Marietta, Ohio. This fine pusher was built at St. Louis Ship in 1945 for the Simpson Oil Co., Charleston, Mo., powered by twin Cooper-Bessemers, over 2200 hp.

ANOTHER McAlexander towboat from Greenville that "gets around" is the *Betty Sue*, said to be with small twin Caterpillars, was headed to Cairo to engage for some time in the Chattanooga trade up the scenic Tennessee. Earl Carpenter is the chief engineer.

IN MID-MAY we came back to Cairo for the night and day looking about, noting the speedy *T. M. Norsworthy*, reported with GM diesels, heading down river having delivered two barges of oil at Follansbee, West Va., on record time.

ONE OF the busiest boats on the Ohio in May was the 3000 hp. *Lin Smith* working under charter for the Mississippi Valley Barge Line. She has had a great reputation since coming out new at the Nashville Bridge Yards in 1946, one of the real workhorses of the long trades, oil and alcohol. She has three Cooper-Bessemers. In charge of the engines is Chief R. M. Thomas.

PERHAPS THE heaviest upstream tow observed on the Ohio since our last report was 16 barges of scrap metal and crude oil pushed by the *A. M. Thompson* of the Mississippi Valley Barge Line. The *Thompson* is one of the best towboats of all time, using twin Enterprise engines, 2600 hp.

CONSIDERABLE ADO was made at Ohio ports because of the fast trip made by the *Valvoline* of the Ashland Oil fleet from Kenova, West Va., down to Houston and back to Monongahela River ports above Pittsburgh. In addition, this was the longest trip the boat has ever made. The *Valvoline* was once named the *Sohio Cleveland*. She came from St. Louis Ship in 1949, powered by twin General Motors with a rating of 3200 hp.

THE *Paul Blazer* was noted taking a gasoline load down to Evansville for the Ashland Oil folks. The boat was running like new and referred to as the "ageless work boat." She came from the Calumet yards about 12 years ago and while remodeled and improved since, she is a fine advertisement for National Superior diesel engines.

THE M.V. *R. H. McElroy* of the Pure Oil fleet has not been working the upper Mississippi for quite a long time so we were a trifle astonished to see her in May downbound above Keokuk, Iowa. She had gone up a week previously with a nice load of petroleum products. She has a sweet engine room featured by twin Fairbanks-Morse, around 2900 hp.

WE REPORTED the *Codrington* recently in the canal headed for Texas. This month she is in a cooler clime, heading up to Bettendorf, Iowa, with a good average oil tow. This diesel vessel is a very efficient Nashville Bridge product, eight years on the river, getting fine work from her 1200 hp. General motors engine.

West Coast Diesel News

By **Fred M. Burt**

TWO HALLETT diesel generating sets, for Bonneville Dam micro-wave installation, each has a 1-cyl., 5½-hp. air-cooled engine, plus another for standby.

FROM Brown-Bevis Industrial Equip. Co. for Proviso Corp. to use on large real estate development, Sepulveda Blvd., Los Angeles, four TD-24 International tractors with 148-hp. diesel engines.

EIGHT NEW 50-hp. Caterpillar diesel engines, old oil field Chanute, Kan. have Vapor Phase with thermal circulation only, for cooling, low pressure steam from these Engineering Controls units (from waste jacket water heat), used in oil tanks' heat exchanger to settle out oil; this crude oil used for fuel in "Cats".

POWERED WITH a 110-hp., 4-cyl. Cummins diesel is a new Lima shovel for C. F. Braun Co., Alhambra.

WITH BACKGROUND of over 15 years experience in industrial diesel engine sales, Ken Cairns, latterly with City Industrial Engine Sales Co., Chicago, has become engine sales engineer with Engine Sales & Service, Los Angeles (P. & H., Murphy, Enterprise, Witte, Sheppard diesels).

IN Rose Hills cemetery development (Whittier, Calif.) new 250-hp. Caterpillar diesel driving Fairbanks-Morse centrifugal pump supplies moisture to earth dumped in large, sunken sluice box; resultant mud discharged via pipe to build up lower level tiers of earth.

FOR LIGHT and power, Elias Ranch (Tacopa, Calif.) health resort, new 10-kw. Witte diesel-electric set, 12-hp., 1-cyl. dieselized unit.

FOR Atomic Energy Commission for use in Colorado, from Hallett Mfg. Co., Inglewood, Calif., two 5-kw. diesel-electric sets, (1-cyl., 8-hp. engines); two 10-kw. sets, (2-cyl., 18-hp. engines).

FOR U. S. Navy, GE 80-ton switcher locomotives powered with 250-hp. Cummins diesels; six for Port Hueneme, two for Ammo Depot, Fallbrook (both Southern California).

AT Tide Water Associated oil field, Ventura, Calif., eight 300-hp. Ingersoll Rand natural gas engine compressors have had fan/radiator/pump cooling systems replaced with thermal circulation Vapor Phase units, also recovered waste heat, 7000/lb.hr., 20-psi. steam used in heat exchangers to heat crude oil to settle out base sediment and water, 18,000 bbls. daily.

A 150-HP. Cummins marine diesel replaces a gasoline engine in 48 ft. express cruiser *Maurine*, Newport Beach, Calif.

SIGNAL Oil & Gas Co. of California has assumed a big contract to handle huge quantities of natural gas to supply a new gasoline plant of Amarda Company in the Williston Basin, North Dakota; sold through Los Angeles office of Clark Bros. for this project, three 2,000-hp. natural gas engine driven compressors.

RECENTLY appointed sales manager of Anderson-O'Brien Co., Los Angeles, General Motors diesel distributors Southern California, was Regis Hayes, who has had ten years engine sales and service experience in Southern California.

FOR USE by the Navy at Port Hueneme, Calif., seven 15-kw., trailer-mounted electric power units using 4-cyl. 35-hp. at 1200-rpm. Continental diesel engines driving Delco generators; from Hercules Electric Mach. & Equip. Co., Los Angeles.

REPLACING a gasoline engine power at Kennedy Mineral Company's camp at Tecopa, Calif., a 1-cyl. 8-hp. Witte diesel engine driving a 5-kw. Electric Mach. Co. generator now supplies current for lights.

FOR 110 and 220 volt utility power wherever required at Edwards Air Force Base, two 30-kw. diesel-electric sets powered with 4-cyl. 70-hp. Caterpillar diesels have been constructed by Shepherd Tractor & Equip. Co., Los Angeles; enclosed, self-contained, skid-mounted units.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition was ready to mail June 15. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

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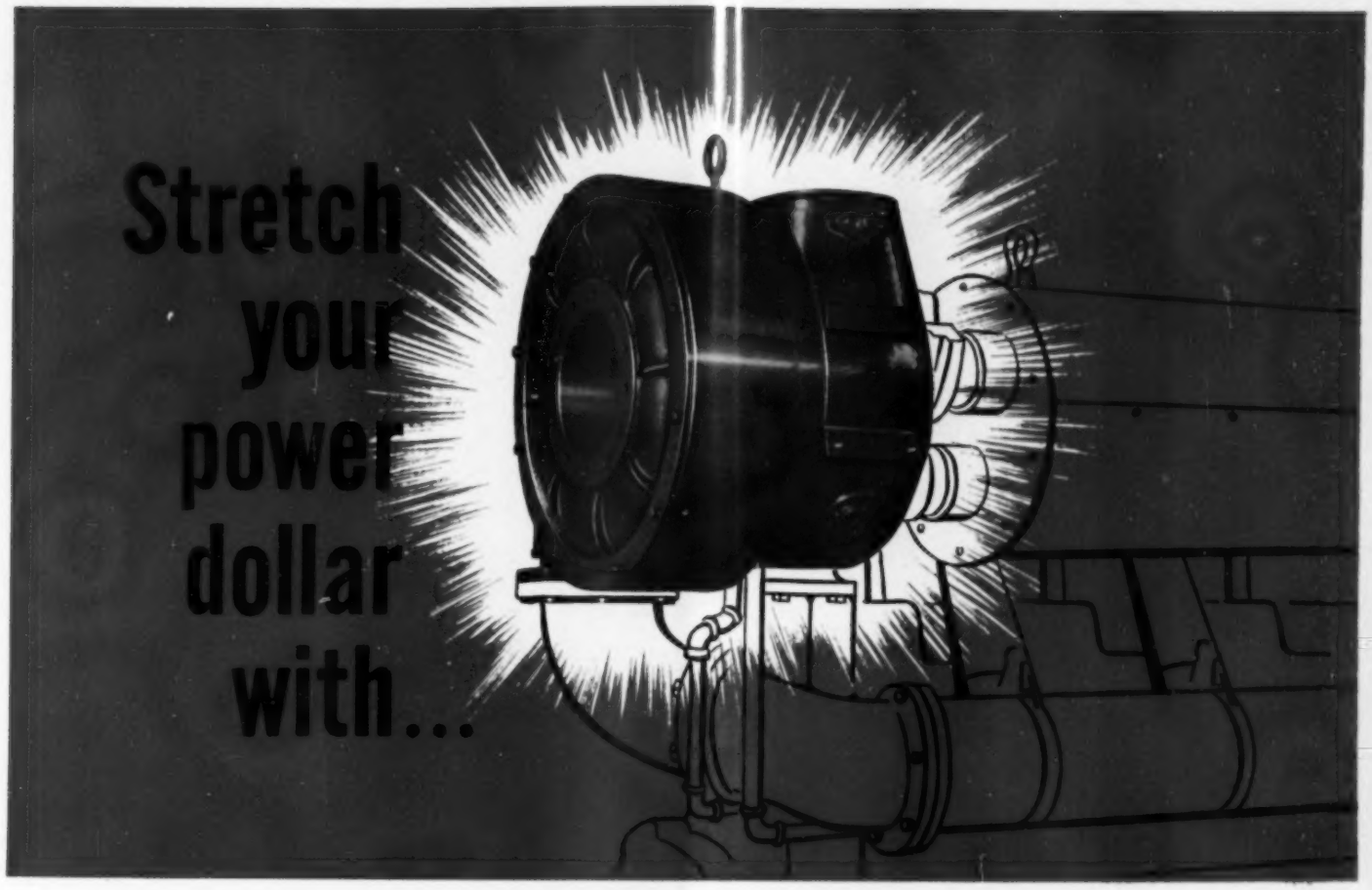

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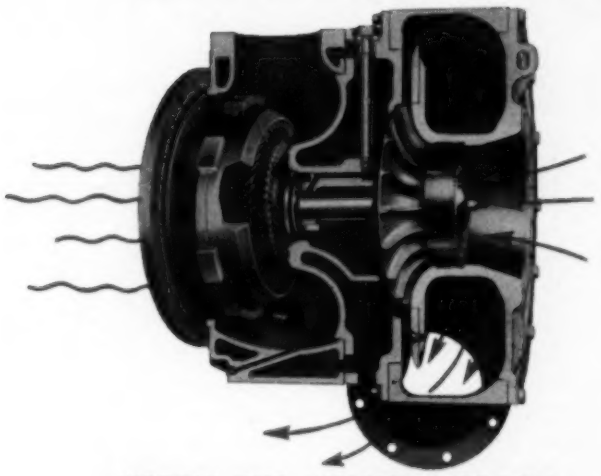

HERE'S THE "INSIDE" STORY

This cutaway view shows the interior construction of a typical Elliott high-pressure turbocharger. Its design — based on years of manufacturing and application experience — is carefully engineered to maintain the critical thermodynamic and volumetric relationships between exhaust temperatures and pressures and rates of air flow to the cylinder.

As an operator of a four-cycle diesel, you'll find the basic economies of Elliott turbocharging an important factor in keeping your operating costs down to profitable levels.

With Elliott turbochargers you're assured of lower weight per horsepower ratios, optimum combustion conditions, improved scavenging, cooler operation and *lower specific fuel rates.*

Operating as they do, off the otherwise wasted energy of engine exhaust gases, Elliott turbochargers provide this improved engine performance without taxing the power output of the engine. In fact, they make possible profitable power production at far greater efficiencies than could be achieved by any other means.

Elliott turbochargers are available in sizes for all four-cycle diesels up to 3500 hp. For further information, write the Elliott Company, Jeannette, Pa.

ELLIOTT Company

M3-7

Supercharger Department

Another Example of Efficient Power at Lower Cost

Repowered "W. H. WELCH"

ALWAYS ready for service . . . more ECONOMICAL too!

HERE'S an interesting example of repowering that resulted in a 45% saving in fuel and a 65% reduction in lube oil consumption.

The cutter "W. H. Welch," engaged in New York Harbor quarantine service, must constantly be in readiness to take inspection groups to vessels in the narrows and maneuver for boardings in any kind of weather.

Powered by the Marine Basin Company, the "Welch's" new Cooper-Bessemer diesel, a 600 hp direct-reversing JS-6, replacing two diesel-electric units, not only assures the maneuverability and dependability essential to avoid damage and injury in the tricky boardings, but permits the above fuel and lube savings as well. Formerly, with the diesel-electric plant, the engines ran continuously during boarding operations. Now, the new direct-reversing Cooper-Bessemer is run only when the "Welch" is underway.

More and more men in marine operations are finding that there's a Cooper-Bessemer diesel just right for any job . . . tough or easy . . . and that it can't be beat.

The Cooper-Bessemer Corporation

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